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THE HUMAN FACTOR IN SHIPWRECKS AND OTHER ACCIDENTS TO SHIPS

ANALYSIS OF AN OFFICIAL SWEDISH SERIES

BY

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Head: Prof. Bertil Roos

INTRODUCTION

The human factor in relation to transport accidents has continuously been investigated where aircraft, motor vehicles, railways, street-cars, and most other road vehicles have been involved. There is, however, one field where investigations with regard to the influence of the human factor in transport accidents seem not to have been carried out, *i.e.* accidents occurring to water craft, especially shipwrecks and other accidents to ships. This lack of knowledge has been underlined when discussing this question with colleagues in Great Britain as well as in the United States. At the same time it has also been stressed that this problem is of international interest and that a contribution of analyses from one country might be of value for other seafaring nations.

When investigating road accidents, a large number of authors draw attention to three groups of causal factors, *viz.* those connected with

(1) road,
(2) vehicle,
(3) man.

When examining the importance of the human factor in accidents to water transport, it might be of value to focus attention on factors connected with

(1) waterway,
(2) ship,
(3) man.

The Waterway.—Accidental factors may be due to the actual shipping-route (canal, river, and lake navigation, coastal and trans-oceanic navigation), the speed and position of the ship (open sea, within the coastal archipelago, in the harbour area), climate, season, time of day, wind and weather, water currents, and tide. Unexpected changes of the bottom of the river or sea, *e.g.* the silting up of estuaries, also belong to this group. The progressive improvement of the maritime safety services (weather forecasts, charts, passage-marking, lighthouses, pilot services) is helping to decrease the number of causal factors connected with the waterway. It seems possible that factors of this kind are more frequently of principal importance in sea accidents than are the corresponding factors in casualties with motor vehicles.

The Ship.—Accidental factors are mainly due to sudden damage to the ship, such as engine or steering-gear trouble, propeller damage, and leaks. These factors vary with the type, size, age, construction, repair, technical equipment, and cargo. Regulations in the maritime law concerning the construction of ships as well as regular inspection and survey of the ships reduce the risk of sea accidents through material defects. Continual improvement of the technical equipment is reducing risks of this kind. On the other hand, the technical equipment may cause an increase in the possibility of accidents, *e.g.* by giving ships greater draught and greater speed, and adding the risk of an improper or unqualified use of new instruments for navigation.

The Human Factor.—This is more complex. The crew on board the ship and the dock workers connected with the activity of the ship have a great responsibility in this respect. The human factor is quite obvious in some cases, but in others the circumstances are more complicated, because the collaboration of several persons is needed in manoeuvring a ship. Furthermore, events at sea often take a very swift and unexpected course.

Regulations for safety in navigation are not only intended to reduce danger and risks connected with

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the ship and the waterway. They are also intended to prevent such human factors as insufficient training, under-manning, too long working hours, unnecessary risks during loading, unloading, and navigation, and poor hygiene on board. The pilotage organization reduces the risks involved in negotiating dangerous passages by providing local knowledge of navigation conditions. By medical examination of seamen, improvement of the conditions on board, voluntary training courses, instruction at sailors' and navigation schools, etc., attempts are made to reduce the risks due to bodily defects and ill-health, poor sanitation, ignorance, insufficient experience, incompetence, and lack of alertness. Among other things, the merchant navy inspectors check that the ship is sufficiently manned.

Material

With this background we planned an investigation of the influence of the human factor in water transport accidents. The necessity of a study in this connexion was obvious also to the authorities concerned, and the Swedish National Board of Shipping and Navigation kindly gave us access to its records of official investigations and reports of accidents to ships. For practical reasons the year 1953 was chosen as the starting point. In accidents involving one Swedish ship and one non-Swedish ship we were not always able to investigate the circumstances in the non-Swedish ship and are, therefore, unable to define exactly the part played by the other ship in causing the accident.

Of 357 documents placed at our disposal, 266 involved ship accidents with material damage. The accidents were divided into five groups:

(1) Grounding.
(2) Collision.
(3) Engine breakdown.
(4) Fire and explosion.
(5) "Other damage to ship and cargo."

Grounding is used in its current sense of "running aground", independent of the extent of the damage. This group includes ships which had only run aground without serious damage. Under *collision* were included all ships involved in a collision, including those which had run aground afterwards. The collisions may have been of different kinds, with another ship, with a quay, or with an object floating in the water.

Engine breakdown includes all accidents considered to have been due to mechanical damage, including that to the propeller and steering gear.

Fire and explosion includes the cases in which the accident reports mentioned these occurrences. One case of a mine-explosion was also included here.

"*Other damage to ship and cargo*" includes registered damages to the hull of the ship with or without leakage and/or damages caused by shifting of the cargo.

The relevant facts for each case were transferred to register-cards.

In the primary tables, worked out from the data on these cards, the following information was set out: type and age of ship, time, and weather. The extent of the damage was roughly classified as follows:

(1) Total shipwreck;
(2) Considerable damage;
(3) Moderate damage;
(4) Minor damage.

These grades included losses due to the ship's loss of time.

The cases were then grouped according to the main causal factor under the headings waterway (W), ship (S), and man (M).

Those in which the human factor was mainly responsible for the accident were then divided into three sub-groups:

(1) *Medical* (M_1): Illness, physical defect, intoxication by alcohol, narcotics, or other drugs, and exhaustion.

(2) *Professional* (M_2): If the accident was caused by incompetence or ignorance in connexion with this lack of professional skill, the case was included in this sub-group. By incompetence is meant lack of the acquired skills tested by the necessary maritime examinations.

(3) *Psychological* (M_3): Inattention, lapse of memory, misjudgement, omission to conform to safety-rules, chance-taking and carelessness, erroneous navigation, misreading of maps, miscalculation in manoeuvring.

For every accident a *main cause* was recorded, and in addition, any contributory cause or causes (abbreviated like those used for the main factors, w, s, m, m_1, m_2).

In some cases the circumstances leading to an accident included human acts, remote in time, which were not the principal or contributory cause of the actual accident, but nevertheless were partly to

blame: for instance, too small towing boats in certain ports, insufficiently controlled cargo, and faults of lighthouses or maps. Remote human factors of this kind were noted by the abbreviation R.

A thorough investigation and discussion of each case with various marine authorities was undertaken before the grouping was done. It is felt that examples of typical accidents illustrating the different types of causal factors need not be published in this paper, since the groups are generally fairly well defined as a result of the thorough reports.

In addition to the analysed factors, the documents also revealed a number of conditions of medical interest, whose connexion with the accidents in question it was not possible to prove. It was chiefly the question of illness, intoxication, mental stress of different kinds, and too long working hours. Some of these conditions will be dealt with in the discussion below.

In Table I the 266 accidents have been distributed by type of ship.

Collisions constitute the biggest group (or 36·9 per cent. of all accidents), followed by 27·9 per cent. of ships running aground. The groups "engine breakdown", "fire and explosion", and "other damage to ship and cargo" occur less frequently: 12·4, 8·2, and 14·6 per cent. respectively.

Of the ships referred to, 44 and 32 per cent. respectively, were motor-ships and steamers. The number of different types of ships is taken from official sources. At the beginning of 1953 the Swedish merchant navy registered 624 sailing ships with auxiliary motor (33·1 per cent.), 621 motor-ships (33 per cent.), 504 steamers (26·8 per cent.), and 133 tankers (7·1 per cent.), a total of 1,882 ships in all. The 266 accidents which caused material damage thus represent 13·9 per cent. of the total. Three ships were involved in two accidents each during the same year.

The percentual age-distribution of the ships, calculated for our series and for the whole commercial navy is given below:

Age of Ship (yrs)	0–4	5–9	10–19	20–29	30–49	50+
I Present Series (1953) ..	15·8	18·8	16·9	8·6	28·6	11·3
II Whole Merchant Navy (at the end of 1953)	9·5	10·4	11·0	7·3	36·9	24·9
Difference I–II	+6·3	+4·4	+5·9	+1·3	−8·3	−13·6

There is a tendency to an increase in the frequency of accidents among new ships, and a corresponding tendency towards reduced frequency in ships more than 30 years old. A difference in navigation frequency among ships of different age might account for this, but this cannot be ascertained from the available statistics.

The tonnages of the ships in our series is compared with those of the whole Swedish merchant navy as follows:

Tonnage ..	20–99	100–499	500–1,999	2,000–4,999	5,000–9,999	10,000
I Present Series (1953) ..	9·1	20·2	32·5	22·8	12·3	3·1
II Whole Merchant Navy (at the end of 1953)	34·3	29·5	17·5	10·1	6·6	2·0
Difference I–II	−25·2	−9·3	+15·0	+12·7	+5·7	+1·1

The distribution of accidents according to tonnage diverges from the corresponding distribution in the whole merchant navy. The greatest difference is seen in the group 20–99 gross registered tons, where the accident figures are as much as 25·2 per cent. lower than those of the whole merchant navy.

In the group 100–499 gross registered tons, the accident frequency was also considerably lower (−9·3 per cent.). In the middle groups (500–1,999

TABLE I

ACCIDENTS OF DIFFERENT TYPES TO SWEDISH MERCHANT SHIPS DURING 1953

Type of Accident	Type of Ship									
	Motor-sailers		Motor-ships		Steamers		Tankers		Total	
	No.	percent.	No.	percent.	No.	percent.	No.	percent.	No.	percent.
1. Running aground	14		24		27		9		74	27·9
2. Collision	10		47		33		8		98	36·9
3. Engine breakdown	2		20		8		3		33	12·4
4. Fire and explosion	3		14		4		1		22	8·2
5. "Other damage to ship and cargo" ..	13		12		13		1		39	14·6
I. Present Series	42	15·8	117	44·0	85	32·0	22	8·2	266	100·0
II. Whole Swedish Merchant Navy, 1953	624	33·1	621	33·0	504	26·8	133	7·1	1,882	100·0
Difference of percentages (I–II)		−17·3		+11·0		+5·2		+1·1		

and 2,000–4,999), however, the frequency was 15·0 and 12·7 per cent. higher respectively, and in the two largest groups the difference is insignificant. It seems difficult to explain these differences, particularly as the more fatiguing double-watch system is common in ships under 500 gross registered tons. A conceivable contributory cause of the favourable figure for small ships might be that these have on an average a lower turnover than large ships.

The factors we have judged as *main causes* are listed in Table II, according to type of accident.

The main causes classed as W, S, and M occur in *the whole series* in 28·2, 13·1, and 58·7 per cent. of cases respectively. The human factor, accordingly, is the predominant primary factor.

If, however, we consider the types of accident, significant differences appear. The W-factor is thus the most important cause of the group "other damage to ship and cargo" (64·1 per cent.), but plays a small part in the origin of fire and explosion (5·0 per cent.). In all the other groups this factor occurs in about 20 to 30 per cent.

The S factor is predominant in the group "engine breakdown" (42·4 per cent.) and is also a frequent cause of "fire and explosion" (35·9 per cent.), but is less important for other types of accident.

The human factor (M) is predominantly concerned in collision (75·5 per cent.), running aground (70·5 per cent.) and fire and explosion (59·1 per cent.). In the groups "engine breakdown" and "other damage to ship and cargo", the M-factor was responsible for 27·3 and 20·5 per cent. respectively.

In order to ascertain whether similar differences exist in the various type of ships, this distribution is shown in Table III, which shows that the M-factor was a main cause in a little more than 80 per cent. of accidents in tankers. For other types of ships the percentages lie between 50 and 60.

The W-factor came next in importance in all types of ship, being lowest for tankers (about 14 per cent.), and averaging 30 per cent. for other types of ship.

The S-factor was the most frequent cause among auxiliaries and motor-ships (about 19 and 6 per cent. respectively) and was lowest among steamers and tankers (8·3 and 4·5 per cent. respectively).

The extent of the damage is analysed by type of accident and cause of accident in Table IV (opposite).

Slight and moderate damage were each recorded in about one-third of the cases, considerable damage in just over one-quarter and total loss in the remaining 7·8 per cent. As regards the total shipwrecks, only 21 in number, in one of which the ship disappeared without a trace, the waterway and the human factors seem to be more common as the main causes than the S-factor.

TABLE II

ACCIDENTS BY TYPE OF ACCIDENT AND PRIMARY CAUSE

Type of Accident	Primary Cause						Total Number
	Waterway (W)		Ship (S)		Man (M)		
	Number	per cent.	Number	per cent.	Number	per cent.	
Running aground	20	27·1	2	2·7	52	70·2	74
Collision	19	19·5	5	5·2	74	75·3	98
Engine breakdown	10	30·3	14	42·4	9	27·3	33
Fire and explosion	1	5·0	8	35·9	13	59·1	22
"Other damage to ship and cargo"	25	64·1	6	15·4	8	20·5	39
Total	75	28·2	35	13·1	156	58·7	266

TABLE III

ACCIDENTS BY CLASS OF SHIP AND PRIMARY CAUSE

Class of Ship	Primary Cause						Total
	Waterway (W)		Ship (S)		Man (M)		
	Number	per cent.	Number	per cent.	Number	per cent.	
Motor-sailer	12	28·6	8	19·1	22	52·3	42
Motor-ship	31	26·5	19	16·2	67	57·3	117
Steamer	29	34·1	7	8·3	49	57·6	85
Tanker	3	13·6	1	4·5	18	81·9	22
Total	75	28·2	35	13·1	156	58·7	266

TABLE IV

APPROXIMATE EXTENT OF DAMAGE IN DIFFERENT TYPES OF ACCIDENT

Type of Accident		Extent of Damage																Total
		Total Shipwreck				Considerable Damage				Moderate Damage				Slight Damage				
		W	S	M	Total	W	S	M	Total	W	S	M	Total	W	S	M	Total	
Running aground		2	—	3	5	8	—	21	29	4	1	16	21	6	1	12	19	74
Collision		1	—	4	5	1	1	13	15	4	3	21	28	13	1	36	50	98
Engine breakdown		—	1	—	1	1	6	4	11	8	5	5	18	1	2	—	3	33
Fire and explosion		—	1	3	4	—	2	6	8	1	2	2	5	—	3	2	5	22
"Other damage to ship and cargo"		4	2	—	6	4	2	2	8	13	—	5	18	4	2	1	7	39
Total	No.	7	4	10	21	14	11	46	71	30	11	49	90	24	9	51	84	266
	Per cent.				7·8				27·0				33·8				31·4	100·0

Of 97 registered contributory causes (Table V), 48 were connected with the waterway, eight with the ship, and 41 with the human factor. Of the latter six were medical (m_1), four professional (m_2), and 31 psychological (m_3).

TABLE V

CORRELATION OF MAIN AND CONTRIBUTORY ACCIDENTAL FACTORS

Main Cause		Contributory Cause						
		w	s	m				Total
Factor	No.			1	2	3	Total m	
W	75	—	5	4	—	5	9	14
S	35	4	—	1	—	1	2	6
M_1	12	—	—	—	1	1	2	2
M_2	13	1	—	—	—	7	7	8
M_3	131	43	3	1	3	17	21	67
Total	166	48	8	6	4	31	41	97

Table V shows that there was a contributory human factor (m) in nine of the 75 cases in which W was the main cause (four of them on account of m_1 and five on account of m_3). In the 35 cases in which S was the main cause, m_1 was recorded as a contributory factor in one case and m_3 in another. The human factor was thus represented in 167 cases (62·9 per cent.), 156 primary and eleven contributory.

A remote human factor (R) was discernible in a total of eighteen cases, eleven referable to W and seven to S (Table VI). Even among cases with M as a main cause, m and R were also recorded in thirty and seven cases respectively. The thirty accidents in which m was a contributory factor, included one case referred to as m_1, four to m_2, and 25 to m_3.

On further analysis of the importance of the human factor, consideration was given not only to the immediate human factor, both as a primary and a contributory cause, but also to the remote human factor (R). Table VI shows the frequency of all these types of human factor; M being the main cause in 156 of the 266 accidents (58·7 per cent.), twelve (4·5 per cent.) as a consequence of M_1, thirteen (4·9 per cent.) of M_2, and 131 (49·3 per cent.) of M_3.

A human factor either immediate or remote was accordingly noted in 185 of 266 shipwrecks (69·5 per cent.).

TABLE VI

HUMAN FACTOR AS MAIN OR CONTRIBUTORY CAUSE

Accidents		Human Factor														
		Immediate										Remote R		Total M+m+R		
		Main					Contributory			Total						
Type	No.	Medical	Professional	Psychological	Total M		Medical	Professional	Psychological	Total m		M+m				
		M_1	M_2	M_3	No.	Per cent.	m_1	m_2	m_3	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Running aground	74	7	9	36	52	70·2	3	0	2	5	6·9	57	77·1	4	5·4	61	82·5
Collision	98	1	3	70	74	75·3	1	0	3	4	4·2	78	79·5	2	2·1	80	81·6
Engine breakdown	33	0	1	8	9	27·3	0	0	0	0	0·0	9	27·3	5	15·2	14	42·5
Fire and explosion	22	4	0	9	13	59·1	0	0	0	0	0·0	13	59·1	2	9·1	15	68·2
"Other damage to ship and cargo"	39	0	0	8	8	20·5	1	0	1	2	5·1	10	25·6	5	12·9	15	38·5
All Shipwrecks	266	12	13	131	156	58·7	5	0	6	11	4·2	167	62·9	18	6·9	185	69·8

The distribution of accidents attributable wholly or in part to human factors (M, m, R) *by different types of employee* was as follows:

69 deck-officers (42 per cent.),
9 marine engineers (4 per cent.),
11 remaining crew (5 per cent.),
14 pilots (7 per cent.),
53 persons in other ships (28 per cent.),
22 persons on shore (11 per cent.).

Seven cases (3 per cent.) were attributable to more than one person in different groups.

The correlation between different types of accident factors and different types of accident is shown in Tables II and VI.

Thus 70·2 per cent. of the runnings aground were judged to be caused primarily by human factors. In five other cases an m-factor was included and in four cases an R-factor, so that the total with a human causal factor (M, m, or R) was 82·5 per cent. (Table VI).

In 75·3 per cent. of the collisions a human factor was found to be the main cause, 73 per cent. being assigned to persons in the other ship, 18 per cent. to persons in their own ship, seven per cent. to persons in both the ships involved, and two per cent. to persons outside both ships. Moreover, the m-factor occurred in four cases of those primarily assigned to W or S. The R-factor occurred in two cases. All the collisions with a human causal factor (M, m, or R) amounted to 81·6 per cent.

In 27·3 per cent. of the engine breakdowns the cause was the human factor. The m-factor did not occur, but the R-factor occurred in five cases, so that a human factor (M or R) occurred in 42·5 per cent. of engine breakdowns.

In 59·1 per cent. of the "*fire and explosion*" group the human factor was the main cause; m did not occur in the cases referred to W or S, but there were two cases with an R-factor, bringing the total M or R to 68·2 per cent.

In cases of "other damage to ship and cargo", the human factor was a main cause in 20·5 per cent., the m-factor also occurred in two cases referred to W or S, and the R-factor in five more. Thus a human factor (M, m, or R) occurred in altogether 38·5 per cent. of this group.

On looking more closely at the occurrence of a medical factor in the material, we find such a factor in eighteen cases; twelve were registered as a main cause*, and six as a contributory cause†: four in cases attributed to W, and one in a case attributed to S. There was also one case in the group M_3 in which a contributory medical factor was found.

Another 42 cases of medical interest were noted, though other factors had actually caused the accidents. These included one case of tuberculosis, one of nose-throat infection, one of seasickness, two of night-blindness, three of alcoholic intoxication, nineteen of exhaustion, and fourteen of various mental disorders.

The information obtained by checking the material concerning medical conditions may by no means be regarded as an expression of the general state of health on board Swedish ships, but they invite certain reflections. Diseases of chronic as well as acute character must certainly imply an increased load of work and responsibility for the remaining crew. This will particularly be the case if the ill-health on board is very wide spread. In exacting situations such circumstances might contribute to overstrain in the members of the reduced staff and thus increase the risk of accidents caused by medical as well as by psychological factors. Severe forms of exhaustion are most apt to be caused by long spells of duty under adverse conditions. As sudden and exacting changes in weather often occur without warning, it is important that, at the beginning of a voyage, the crew should be thoroughly rested and in good condition. Information obtained in the course of these investigations denotes that mental stress also may arise from language difficulties.

Lack of professional skill (M_2) was the main factor in thirteen cases, and a deficiency in formal competence was noted in a further nine cases, making altogether 8·2 per cent.

"Taking a chance", carelessness, omission, inattention, forgetfulness, misjudgement, faulty navigation, or miscalculation in manoeuvring (M_3) was the primary cause in 131 cases. In addition, there was an m-factor in eleven cases, and an R-factor in eighteen cases. Errors of this type were also noted in 54 other cases, but not in connexion with the accidents.

We have purposely avoided an attempt to divide the psychological factors into groups, as the reports, coming as they did from various quarters, were not written in a uniform terminology. To attack this

* One case of heat stroke, one case of colour-blindness, four cases of exhaustion, and six cases of alcoholic intoxication.

† One case of nose-throat infection, one case of alcoholic intoxication, and four of exhaustion.

question scientifically one might be forced to collect a special series. In some of the documents it is mentioned that the person concerned had been declared responsible for the accident by a court of law, but in other cases the question of responsibility was left unanswered. Furthermore, information on this point is missing altogether in many cases. In our scrutiny we have desisted from assessing responsibility. The question of guilt is of little importance in forming an opinion about preventive measures. It is of interest to make comparisons here with the investigation of the Swedish National Traffic Insurance Association concerning motor vehicle accidents leading to personal injury; in this survey the human factor was found to be at fault in 91·9 per cent. of cases in the year 1947 and 90·7 per cent. of cases in the year 1952.

The W-factor was often observed in our investigation, which is to be expected on account of the fickleness and changing risks of the sea and the weather generally. It was a main cause in 28·2 per cent. of the cases in our series, whereas the Swedish National Traffic Insurance Association blamed the road factor for 5·3 and 4·6 per cent. of cases respectively in the investigation mentioned above.

Accidents were caused by the S-factor in 35 (13·1 per cent.) of our cases, but the vehicle factor was blamed in only 4 and 3·6 per cent. by the Swedish National Traffic Insurance Association. The ship factor in our investigation thus exceeds the vehicle factor in the investigations of the Swedish National Traffic Insurance Association by 10 per cent. This difference is due to the fact that "the vehicle" in maritime traffic is probably exposed to comparatively great strains.

Furthermore, one cannot, as for traffic accidents with motor vehicles, elicit any maximum for a certain month, etc. This applies to the whole series including the cases due to human factors. Accumulations of accidents during some stormy days at the turn of February–March, 1953 (23 cases), underline the paramount importance of good health and physique among sailors as stated above in the discussion of the medical factor.

Discussion

In this investigation the influence of the human factor in shipwrecks and damage to ships at sea is studied. The data concern Swedish merchant ships and originate from the official records of the National Board of Shipping and Navigation in Sweden for the year 1953. In reports of this kind the stress is laid upon maritime, juridical, and technical facts. The penetration of human factors relating to medical questions, such as acute or chronic illness, symptoms of disease, alcoholic intoxication, and reactions from prescribed medicines, is, however, not so detailed as might have been possible had the series been specially collected for the purpose of such an investigation. The present series must for this reason be regarded only as a pilot study.

Our results show in a convincing way, however, that the human factor is of great importance in the causation of shipwrecks and damage to ships at sea. Among various human factors—except purely medical ones—there are those connected with insufficient skill and psychological factors of various kinds.

A more complete and reliable knowledge of the medical and psychological factors contributing to the occurrence of accidents to water transport would, in our opinion, indicate measures which might help to prevent accidents of this kind.

Shipwreck and other damage to ships at sea involve heavy loss of life and large sums of money. In Scandinavia the need of preventive action has recently been strongly emphasized, and in the past two years some shipping companies have arranged special training courses in addition to the ordinary merchant navy training. Three cargo ships, operating in the ordinary trades, have been converted into training ships aboard which apprentices, in addition to the theoretical subjects required for the mates' certificates, are introduced to the constructive principles of safety at sea. The sailors' union has also arranged a number of courses, in which experienced teachers educate sailors to a sense of personal responsibility in the prevention of accidents. The navigating and engineer officers' unions, realizing the need of continuous education for their members, publish expert papers in their periodicals. The textbooks in use at the navigation schools are constantly revised. In Norway, one of the navigation instructors, Leiv Jernaes, has published a book entitled "Anti-collision" (1959). The insurance companies have also seen the importance of thorough education for seafarers, and Gustaf Ahrne, vice-president of a prominent Swedish insurance company, has published a book called "Radar on Board" (1957). A retired Norwegian insurance president, Thoralf Wikborg, has continuously followed and commented on every kind of shipwreck and other cases of damage to ships at sea in a periodical called *Tales from the Sea*. At the Department of Social Medicine of the University of

Gothenburg, investigations are in progress on subjects related to marine medicine. In May, 1959, a special conference was convened by the Swedish National Board of Shipping and Navigation at which the whole field of water transport was surveyed from the point of view of accident prevention and several new suggestions were discussed.

In spite of what has already been done, extensive research into the causes of marine accidents and methods of prevention is an urgent task.

Brit. J. prev. soc. Med. (1960), **14**, 57

SMOKING HABITS RELATED TO INJURY AND ABSENTEEISM IN INDUSTRY

BY

C. R. LOWE

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In February, 1957, a mass radiography unit visited the General Electric Company Limited at Witton, Birmingham, and 7,680 employees (70 per cent. of the population) were *x*-rayed. As the employees attended for examination a smoking history was taken from them by the clerks of the unit. The data collected formed part of a larger survey of smoking habits in the Midlands, the results of which have already been published (Cross, McDowell, and Posner, 1957). Among the employees of the General Electric Company who were questioned there were 3,341 male workers who remained with the firm throughout the 12 months ended December 31, 1957. This paper examines the frequency of attendance at ambulance rooms for treatment of injury and the frequency of absenteeism among these men in relation to their smoking habits.

Current Smoking Habits of the Factory Workers

The smoking habits of these factory workers are summarized in Table I. Of the 3,341 men who were questioned, 63·7 per cent. said that they were cigarette smokers, 4·7 per cent. that they smoked only a pipe, 8·4 per cent. that although in the past they had smoked they were now non-smokers, and 23·3 per cent. that they had never smoked.

This picture is the end result of the interplay of age and secular trends. As men get older they smoke more and young men to-day smoke more than their fathers did when they were the same age. These trends are shown in Fig. 1 (overleaf). The proportion of men who said they had at some time smoked regularly increased rapidly with age, reaching a peak at ages 45–54; thereafter it decreased—a clear indication of a secular increase in the proportion of smokers. On the other hand the proportion of pipe smokers and of those who had given up smoking increased regularly from the youngest to the oldest age group. As the result of these conflicting trends, the proportion of men who at the time of the survey were regular cigarette smokers fell off very considerably beyond the age group 45–54, so much so that there were no more cigarette smokers over the age of 65 than there were in the age group 20–24. It is also true that older smokers smoke more than younger smokers and that young smokers to-day are smoking more than young smokers of a generation ago. In this sample the mean number of cigarettes smoked per day by smokers increased from about 10 at ages 15–19 to nearly 20 at ages 34–44, and thereafter declined to about 16 at ages 65 and over (Fig. 2, overleaf).

Clearly, information about the smoking habits of a population is of little value unless it is age standardized and the date on which it was collected is known.

TABLE I

SMOKING HABITS OF 3,341 MALE FACTORY WORKERS

Non-smokers		Smokers					Total
			Cigarettes (per day)				
Never Smoked	Given Up	Pipe only	1–9	10–19	20–29	30 and Over	
777	280	158	361	988	604	173	3,341
23·3	8·4	4·7	10·8	29·6	18·1	5·2	100 per cent.

Attendance at Ambulance Rooms for Works Injuries

From records in the works medical department it was possible to find out how many times during the 12 months ended December 31, 1957, each of the 3,341 men had attended an ambulance room for treatment of an injury sustained at work. It should perhaps be mentioned here that from a surgical point of view the great majority of these injuries were trivial. They consisted for the most part of minor lacerations, contusions, abrasions, and

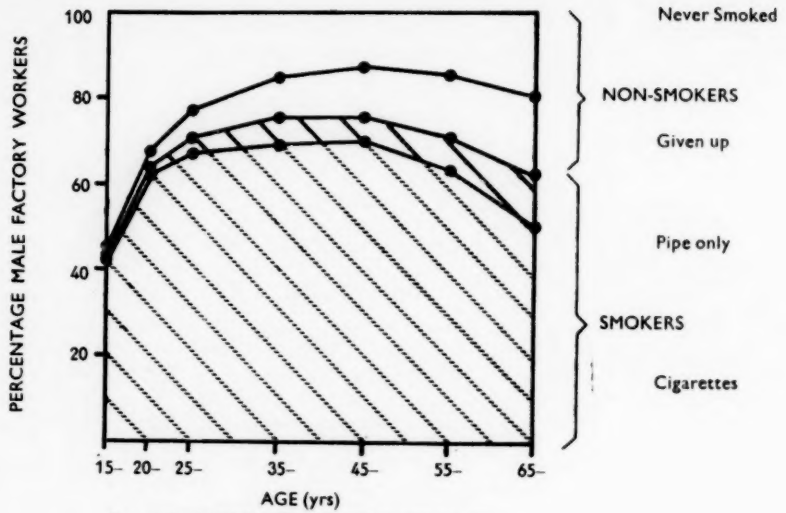

FIG. 1.—Smoking habits of factory workers related to age.

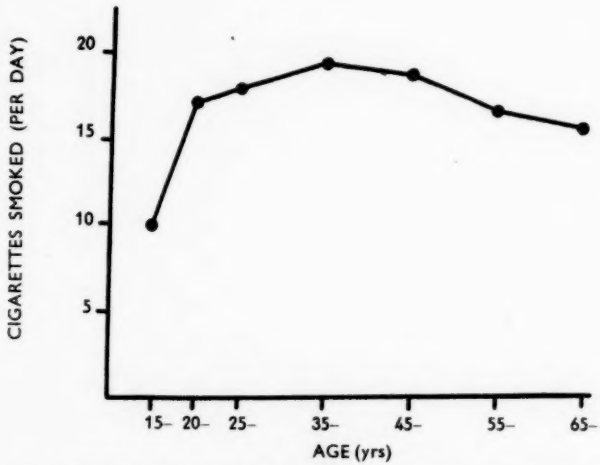

FIG. 2.—Number of cigarettes smoked per day by regular cigarette smokers, related to age.

puncture wounds of the hands and wrists, with a fair proportion of foreign bodies in the eye, foot injuries, and muscular strains. There were also of course a few serious injuries which required hospital treatment. The total number of attendances for works injury during the year was 6,838 (2·05 per worker) and the number of first attendances (*i.e.* the number of injuries treated) was 3,878 (1·17 per worker).

There is no doubt that some individuals are more accident prone than others, and a great deal has been written on the subject. It is of interest, therefore, that the distribution of treated injuries among the men was far from random. During the year 6·8 per cent. of them attended for five or more new injuries. If the

distribution had followed the Poisson pattern, the expected proportion would have been 0·8 per cent. (Table II).

TABLE II

NUMBER OF WORKS INJURIES TREATED FOR 3,341 FACTORY WORKERS DURING 1957

No. of Injuries..	0	1	2	3	4	5 and Over	Total
No. of Workers	1,848	665	298	187	115	228	3,341
Percentage Distribution ..	55·3	19·9	8·9	5·6	3·4	6·8	100 per cent.
Expected (Poisson) Distribution ..	31·0	36·3	21·2	8·3	2·4	0·8	100 per cent.

In Table III and Fig. 3 attendance at ambulance rooms for treatment of injuries is related to age. Both number of attendances and number of injuries treated per worker decreased with age. (For example, for the age group 15–24 there were 1·36 treated injuries per worker, while for the age group 55 and over the corresponding rate was only 0·83). This pattern is consistent with the findings of Newbold (1926) and others. But King and Speakman (1953) have pointed out that there are many inconsistencies in the literature, and the observation that in general accident rates appear to decline with age needs to be interpreted with caution. The finding is not unexpected in that young people who are incompletely

TABLE III

ATTENDANCE AT AMBULANCE ROOMS FOR INJURY RELATED TO AGE

Injuries Treated during 1957	Age (yrs)					Total
	15–24	25–34	35–44	45–54	55 and Over	
No. of Attendances per Worker ..	2·27	2·18	2·09	1·84	1·59	2·05
No. of Injuries per Worker	1·36	1·26	1·18	1·03	0·83	1·17
No. of Attendances per Injury ..	1·64	1·69	1·74	1·76	1·91	1·71
Population	700	834	836	555	416	3,341

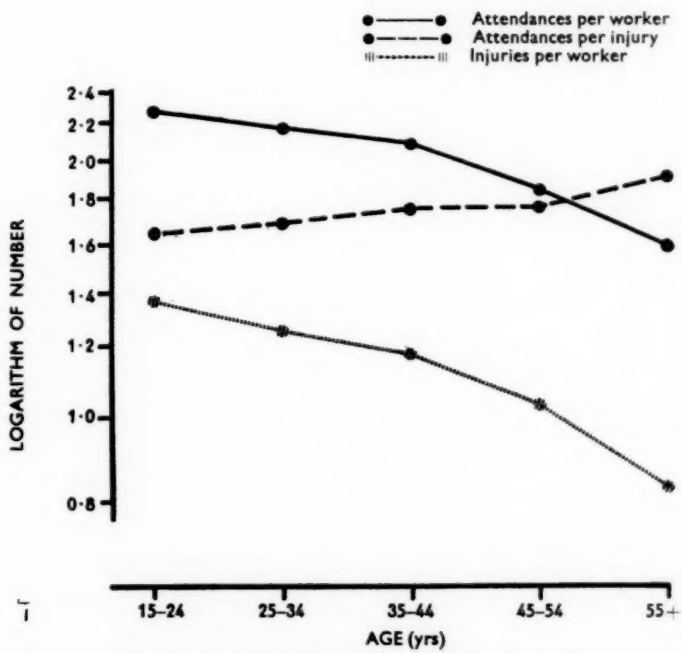

FIG. 3.—Attendances at ambulance room for injuries, related to age.

trained easily become bored and sometimes behave irresponsibly—both skill and carefulness are attributes of ageing. On the other hand muscular power and visual and auditory acuity begin to decline in middle life, which might be expected to cause accident rates to increase. Complicating factors are the tendency for promotion to lead to occupations that are less hazardous and for older men to be moved on account of disability or failing powers to less dangerous jobs. Above all, it must be remembered that this investigation deals not with accident rates but with attendance at works ambulance rooms for treatment, and it is likely that an experienced worker would be less inclined to leave his job to seek treatment for a minor injury than a younger man. This is borne out by the observation that the number of attendances per injury (to some extent an index of severity) increased with age (Table III and Fig. 3).

Absenteeism for Medical and for Other Reasons

In the works Labour Department a record was available of the number of working days lost by each man during 1957. It was possible to separate time lost for medical reasons (*i.e.* for which a doctor's note had been produced) from time lost for other reasons (*i.e.* for weddings, funerals, football matches, fishing expeditions, etc.). Some small part of the absence not covered by medical certificates (particularly in the shorter durations) was probably due to sickness. But it is likely that in general the distinction between the two types of absenteeism was reasonably accurate. During the year, the 3,341 workers lost between them 35,797 working days, 6·26 per man for medical reasons and 4·45 for other reasons. The distribution of the two types of absenteeism by number of days lost is shown in Table IV.

Table IV

Absenteeism during 1957

Absenteeism during 1957		Number of Days Absent						Total
		0	1–4	5–9	10–14	15–19	20 and Over	
Medical Reasons	Number of Workers	1,180	1,060	495	241	110	255	3,341
	Percentage Distribution	35·4	31·7	14·8	7·2	3·3	7·6	100
Other Reasons	Number of Workers	1,314	907	373	651	83	13	3,341
	Percentage Distribution	39·3	27·1	11·2	19·5	2·5	0·4	100

The pattern of absenteeism in relation to age is well known (Table V and Fig. 4, opposite). The number of days lost for medical reasons increased with age from 4·8 per person at 15–24 years to 10·0 per person at 55 years and over. This was due in the main to an increase with age in the proportion of men who were away for long periods, the proportion who lost no time at all during the year being little affected by age. There appeared to be no age trend in absenteeism for non-medical reasons.

Table V

Absenteeism during 1957 Related to Age

Absenteeism during 1957		Age (yrs)					Total
		15–24	25–34	35–44	45–54	55 and Over	
Medical Reasons	Days of Absence per Worker ..	4·8	5·2	5·2	8·5	10·0	6·3
	Percentage of Workers Absent for 20 or More Days ..	3·3	4·8	6·2	13·5	15·6	7·6
	Percentage of Workers who lost No Time	35·0	30·5	39·0	39·6	32·6	35·3
Other Reasons	Days of Absence per Worker ..	4·1	4·8	4·5	4·4	4·3	4·5
Population		700	834	836	555	416	3,341

Smoking Habits Related to Injury and Absenteeism

It has been shown that frequency of attendance at ambulance rooms for injury decreased with age, absenteeism for medical reasons increased and absenteeism for other reasons was relatively unaffected, while the proportion of smokers at first rapidly increased but later decreased again. Obviously, to explore the relation between smoking habits and injury or absenteeism, age standardization is required.

When the men were classified in relation to both age and amount smoked, it was found that for each 10-year age group cigarette smokers had more injuries treated at the ambulance rooms than non-smokers (Table VI, opposite)

In general, men who were heavy smokers also had more injuries treated than light smokers, but owing to small numbers in some of the age and smoking categories, the pattern was irregular. However, when injury treatment rates for the six smoking categories were age standardized (by applying the age-specific rates in each category to the age distribution of the total population), they showed a regular increase from non-smokers through light smokers to heavy smokers (Table VII, opposite). A similar trend was apparent in absenteeism for medical reasons, but there was no clear relationship

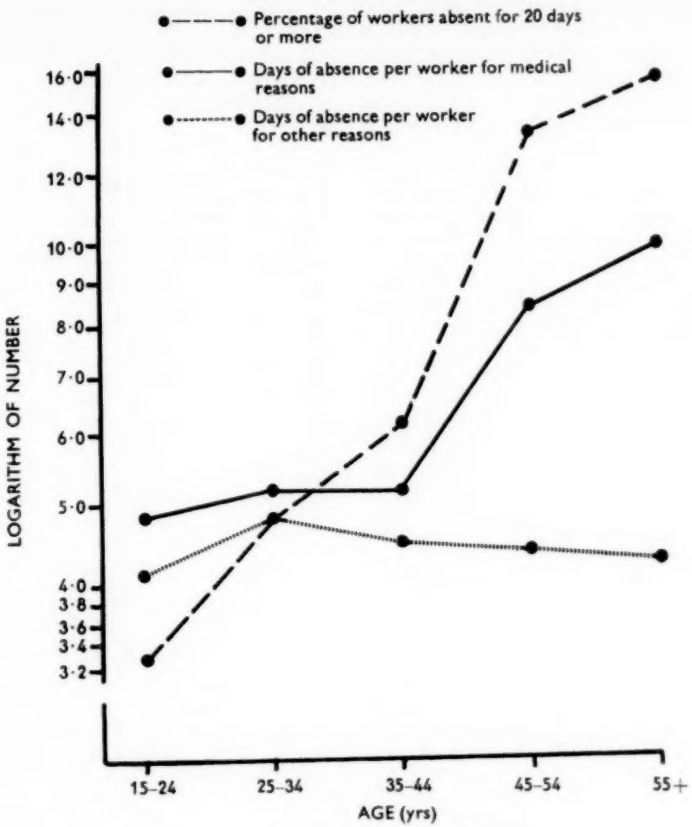

FIG. 4.—Absenteeism related to age.

TABLE VI

NUMBER OF INJURIES TREATED PER WORKER RELATED TO AGE AND SMOKING HABITS

Age (yrs)	Non-smokers	Smokers					Total
		Pipe Only	Cigarettes (per day)				
			1–9	10–19	20–29	30 or More	
15–24	1·23 (344)	0·75 (8)	1·29 (119)	1·64 (170)	1·51 (55)	2·75 (4)	1·36 (700)
25–34	1·06 (249)	1·12 (26)	1·32 (79)	1·42 (282)	1·36 (151)	1·09 (47)	1·26 (834)
35–44	1·11 (202)	1·31 (55)	1·23 (65)	1·02 (238)	1·11 (212)	1·39 (64)	1·13 (836)
45–54	0·92 (135)	0·97 (32)	1·02 (43)	1·03 (187)	1·24 (118)	0·95 (40)	1·03 (555)
55 and Over	0·80 (127)	1·00 (37)	0·93 (55)	0·73 (111)	0·71 (68)	1·50 (18)	0·83 (416)

TABLE VII

ABSENTEEISM AND INJURY (AGE STANDARDIZED) RELATED TO SMOKING HABITS

Absenteeism and Injury during 1957	Non-smokers	Smokers					Total
		Pipe only	Cigarettes (per day)				
			1–9	10–19	20–29	30 and over	
No. of Injuries Treated per Worker	1·05	1·05	1·19	1·22	1·23	1·54	1·16
No. of Days Absence per Worker for Medical Reasons	5·49	6·39	6·11	6·20	6·92	8·63	6·26
No. of Days Absence per Worker for Other Reasons	4·32	4·02	4·51	4·34	5·13	4·52	4·45
Population ..	1,057	158	361	988	604	173	3,341

between smoking habits and absenteeism for other reasons. The number of pipe smokers (198) was too small to permit any firm conclusion to be drawn about them, so they have been excluded from Fig. 5 which summarizes these findings.

As already mentioned, the works population was too small to permit the calculation of useful absentee and injury rates for different smoking categories within a narrow age range. It was apparent, however, that the relation between smoking and injury was more pronounced among the younger men, and the relation between smoking and absenteeism for medical reasons was largely confined to the older men. Fig. 6 compares the experience of men aged under 35 with that of men aged 35 and over. (Within these two broad age groups absentee and injury rates were standardized both for age and for number of cigarettes smoked by the cigarette smokers). It indicates that with regard to treated injuries there was no great difference between older cigarette smokers and non-smokers, but among the younger men the annual rate was 27 per cent. higher for the smokers. On the other hand, for medical absenteeism the picture was reversed: there was no appreciable difference among the younger men, but among the older men absenteeism was 34 per cent. higher for cigarette smokers than for non-smokers.

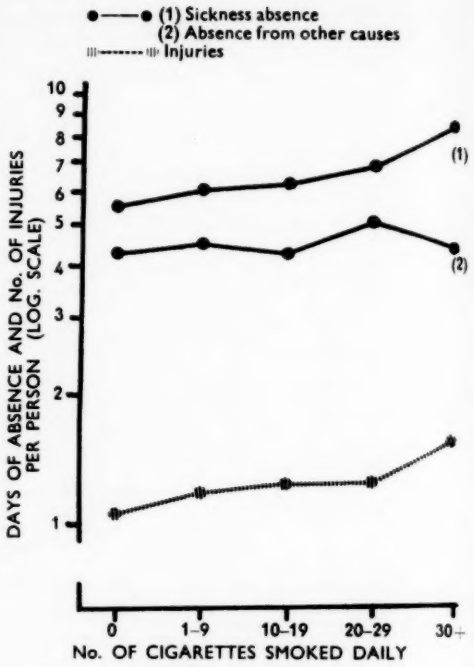

FIG. 5.—Absenteeism and attendances for injury related to smoking habits.

DISCUSSION

Among 3,341 male factory workers absenteeism for non-medical reasons appeared to be unrelated to smoking habits; absenteeism for medical reasons

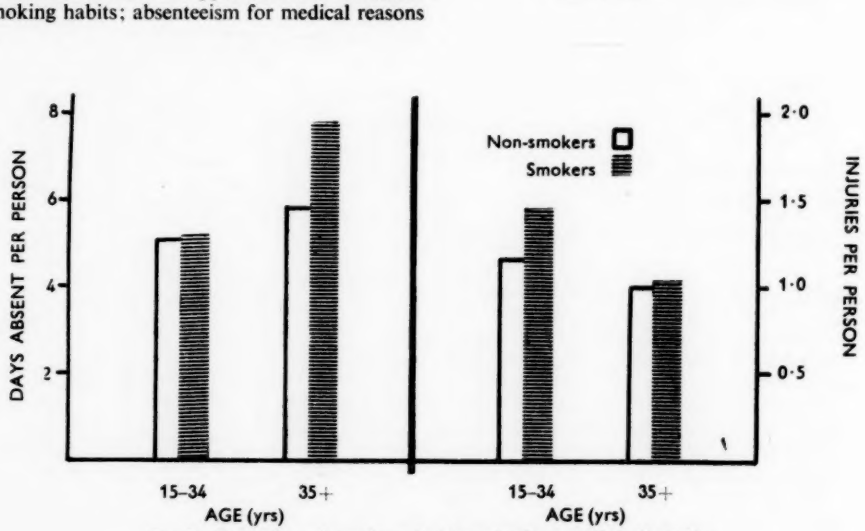

FIG. 6.—Absenteeism and attendances for injury related to age and smoking habits.

and frequency of attendance for treatment of injury were both higher for cigarette smokers than for non-smokers and increased fairly regularly with amount smoked. The relationship between smoking and medical absenteeism affected mainly older workers, and, in view of the known association between smoking and disease, would have been expected. The relationship between smoking and attendance for injury affected chiefly younger workers and would not perhaps have been anticipated. Nevertheless it is not difficult to suggest a possible explanation for this finding. Although it is conceivable that tobacco smoke has a pharmacological effect upon muscular co-ordination, it seems more likely that young people who smoke heavily are temperamentally more accident prone (or more likely to attend for treatment of minor injuries) than those who are light smokers or non-smokers.

These observations are of no great practical significance in relation to absenteeism and injury in industry, but they have a bearing on the smoking controversy. The central question is whether cigarette smoking is a direct cause of lung cancer and the other diseases with which it is consistently found to be associated. It has been suggested that the relationships may be attributable to genetic susceptibility—for example that certain people may inherit both a predisposition to lung cancer and a predisposition to smoke cigarettes (Fisher, 1959). At first sight the observation that accident rates are higher for smokers than for non-smokers might appear to support this view, for it seems reasonable to believe that there is a genetic basis for both accident proneness and the tendency to smoke. It does not follow, however, that it is also reasonable to suppose that smoking and cancer of the lung are linked through genetic susceptibility. The diseases with which smoking has been shown to be associated—lung cancer, chronic bronchitis, coronary artery disease, peptic ulcer, and respiratory tuberculosis—are limited to those in which it was suggested as an aetiological agent long before a statistical association was established. The common sense which accepts a genetic link between smoking and accidents would reject it in the case of diseases in which another and more plausible explanation is available.

SUMMARY

This paper examines the frequency of attendance at ambulance rooms for treatment of injury and of absenteeism among 3,341 male factory workers in relation to their smoking habits.

Frequency of attendance for treatment of injury decreased with age. It was higher among smokers than non-smokers and increased fairly regularly with amount smoked. The relationship to smoking was more pronounced among younger than among older workers.

Absenteeism for medical reasons increased with age. It was higher among smokers than non-smokers and increased with amount smoked. The relationship to smoking was more pronounced among older than among younger workers.

Absenteeism for non-medical reasons did not appear to be related to age or to smoking habits.

The bearing of these observations on the smoking controversy is discussed.

REFERENCES

Cross, K. W., McDowell, L. A., and Posner, E. (1958). *Brit. med. J.*, **1**, 862.

Fisher, R. A. (1959). "Smoking: the Cancer Controversy". Oliver and Boyd, Edinburgh.

King, H. F., and Speakman, D. (1953). *Brit. J. industr. Med.*, **10**, 51.

Newbold, E. M. (1926). Industrial Fatigue Research Board. Report No. 34 (Med. Res. Coun.). H.M.S.O., London.

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CONSUMPTION OF MEDICINES ON A WORKING-CLASS HOUSING ESTATE

BY

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In the first 10 years of the National Health Service the gross cost of prescriptions for drugs and appliances dispensed under the Service rose from approximately £32 million per annum to approximately £63 million. Public concern over the mounting cost of the drug bill, and a widespread belief in both medical and lay circles that the Service was being abused, led to the appointment in 1957 of a committee charged with investigating costs. Its final report issued in 1959 (the Hinchliffe Report) showed that the increase in cost since 1951 had not been disproportionate to the increase in cost of other branches of the National Health Service (Ministry of Health, 1959). In both 1951–52 and 1957–58 the pharmaceutical services accounted for some 10·5 per cent. of the total cost of the N.H.S. The total number of prescriptions dispensed showed, indeed, a tendency to fall in more recent years; and, since the numbers on G.P. lists had increased over the period, the average frequency of prescriptions per person had also fallen. Consequently, the increase in overall costs could be attributed to a rise in the average cost of a prescription. This, in its turn, was due partly to an increase in the quantity of a drug prescribed on a single occasion, partly to the use of more expensive drugs, and partly to an increasing use of proprietary as compared with B.P. preparations.

In making its report, the Committee felt constrained to note that its inquiries, like those of the Guillebaud Committee earlier, had been hampered by shortage of information. Moreover, the complaint was not merely of the shortage of routine statistical data; it was also of the absence of information of a sociological and medical nature which could help in the interpretation of such data.

The Committee drew considerably on the analysis made by Martin (1957) of prescribing habits in 1951. Martin compared available information on such matters as size of doctors' lists, group practices, the demographic characteristics of towns, including mortality rates, age groupings, and social class distribution, and the general prosperity of areas as measured by the value of total retail sales per head with prescription costs and frequencies. He concluded that the different prescription *frequencies* of different regions were a response to differences in climatic conditions, morbidity rates, and "attitudes and expectations as to the appropriate behaviour of doctor and patient when illness occurred". Average *cost* per prescription, on the other hand, was highest in the most prosperous areas in all regions and lowest among the least prosperous. The only other factor which the Hinchliffe Committee found to be systematically linked with apparently excessive frequency of prescribing was the age of the general practitioner. Visits by the Regional Medical Officers of the Ministry of Health to doctors with apparently excessive prescribing habits revealed that they more frequently belonged to the younger age groups than did the general run of prescribing practitioners.

Since the "Survey of Sickness" conducted by the Social Survey for the Ministry of Health came to an end in 1952, information about the characteristics of the recipients of prescribed medicines has been almost totally lacking.* The Ministry of Labour's household budget inquiry in 1953–54 showed that

* A special inquiry was undertaken in 1952 in conjunction with the survey to discover who took prescribed medicines. (See Gray and Cartwright, 1954.)

the average weekly household expenditure on medicines and drugs prescribed under the N.H.S. was 1·4*d.* (Ministry of Labour and National Service, 1957). Since patients in that year directly contributed only 14 per cent. of the total cost of the national drug bill, the total cost of the prescribed medicines obtained by the average household would have amounted to 10*d.* per week. This latter sum also represented the average weekly expenditure on medicines and drugs obtained by households without prescription. Unfortunately, however, the Ministry's published data does not allow us to say how expenditure on prescriptions varied with differences in family composition, social class, income, or region, although it does show how *total* expenditure on medicines and drugs obtained with or without prescription varied with differences in these characteristics.

The most important findings of the Ministry of Labour inquiry were that expenditure per head on all medicines and surgical goods tended to rise with increasing family income; that, holding family income constant, expenditure per head tended to decrease with every additional person in the household; that manual workers spent less per head than professional or managerial employees or self-employed persons with comparable levels of family income; that, at similar levels of household income, expenditure per head in London and Southern England tended to be greater than in other parts of the country.

From both the sociological and the medical standpoint, information concerning medicines obtained without a doctor's prescription may be as significant as knowledge concerning the distribution of prescribed medicines. There are certain questions concerning medication as a whole, which, if they could be answered, would throw a good deal of light on health service usage. For example, are those who indulge in self-medication those who also obtain medicines on prescription, or is self-medication a substitute used by those who for one reason or another do not wish to visit their G.P? Or again, for what type of symptomatic conditions is self-medication relatively important compared with prescribed medication? Do those with a tendency to self-medication have any distinguishing social or economic characteristics? Is the volume of self-medication related at all to differences in doctors' prescribing habits? How far and amongst what kind of people has the habit spread of taking preparations designed to promote health rather than relieve painful or unpleasant symptoms?

Answers to questions such as these cannot be given without inquiry among actual and potential consumers of medicine. An analysis of general practice or hospital records would throw light on some characteristics of those who obtain prescribed medicines and the kind of conditions for which they are prescribed, but not on self-medication and actual consumers.

Some information on medication practices was obtained from a sample of the inhabitants of a post-war housing estate during 1954–55. This paper examines the data in an attempt to answer, for this local field, some of the general questions raised. The general validity of the conclusions needs to be tested by inquiries in other areas.

Data

The data were obtained in the course of an inquiry undertaken by the Public Health Department of the London School of Hygiene and Tropical Medicine. The area of the study was a post-war housing estate built by the London County Council in South-West Hertfordshire. Its inhabitants, who numbered some 17,000 in 1954, were mainly young married couples with children. Only 13 per cent. were over the age of 45 compared with 35 per cent. of the population of England and Wales. About two out of every three of the male tenants were in occupations which could be classified by the Registrar General as belonging to Social Class III, that is, in skilled manual, routine clerical, and shop assistant jobs. Less than 10 per cent. of the households had a tenant in a non-manual occupation.*

Our sample of informants was obtained by drawing a random sample of three-sixteenths of the dwellings on the estate. We tried to obtain information about the health of all the individuals in these dwellings and about their use of health services. Our informants were the adults,† whom we interviewed twice at an interval of 4 weeks. In addition, if there were children in the family, two further visits, with a similar 4-week interval between them, were made to mothers in order to obtain information of the same kind about school and pre-school children.

At the first interview (concerning adult or child) we obtained information about the individual's health at that point in time. At the second interview we concentrated upon obtaining information concerning the events which had occurred since the first

* More detailed information concerning the estate and the methods used in the inquiry are available in articles by Brotherston, Chave, and others (1956), Martin, Brotherston, and Chave (1957), and Cartwright (1959).

† Adults were defined as those aged 15 or over who had left school.

interview 4 weeks previously. We asked them about new illnesses, about consultations which they may have had with G.P.s, with hospital or other health service personnel and with lay people such as chemists, about any days of incapacity through illness, and about medicines taken with or without a prescription during the period.

The question asked about medicines at this second interview was as follows: "During this period have you taken or used any of these sorts of medicines or pills at all: laxatives; health salts; indigestion remedies; throat or cough medicines, sweets, or syrups; aspirin or other pain relieving powders; sedatives or sleeping tablets; antiseptics, gargles, or mouth washes; skin ointments, eye lotions or ointments; embrocation or ointment to rub in; inhalants or things to sniff up your nose; corn pads or anything for the feet; tonics or syrups; vitamin tablets or medicinal foods; do you wear any surgical clothing, appliances, or footwear; is there any other medicine, pills, or ointments you have used, either things the doctor prescribed or things you got yourself?"

If there was a positive reply to any part of this set of questions the respondent was asked for details of the medicine. He was then asked what it was taken for and whether it had been prescribed by a doctor or not. No attempt was made to assess the quantity or the cost of the different types of medicine consumed by individuals. When we refer in this paper to the number of medicines taken we mean the number of different types of medicines listed in our question. Some people took two or more medicines of the same kind; for example, two kinds of cough mixture. In our analysis, however, we have only considered the number of different types of medicine consumed.

We were not able to obtain information concerning all the individuals in the sample of dwellings. Some were not interviewed at all, and the response was inevitably somewhat lower at the second interview than at the first. (It was at the second interview that information was obtained on medicines.) We were able, however, to obtain information about 1,399 adults and 1,056 children, representing 77 and 87 per cent. respectively of the individuals in the sample dwellings. In addition to information obtained in this way, we obtained data on the number of G.P. consultations during 1953 of the 86 per cent. of our sample who were registered during that year with doctors practising on the estate (Brotherston, Chave, and others, 1956).

The first part of our analysis is concerned with the extent of doctor-prescribed and self-prescribed medication as a whole, and with some of the social and health characteristics of those who consumed medicines with or without prescriptions. The second part deals with the types of medicine taken and the conditions to which they were related. In this paper when we use the terms "prescription" or "prescribed medicine" we refer to medicines prescribed by a General Practitioner or hospital. Medicines other than those prescribed by a G.P. or hospital are called either "non-prescribed" or "self-prescribed" medicines and the process of taking them is referred to as "self-medication" or "self-prescribing".

(1) Extent of Medication

About a quarter of the individuals in our sample had taken medicine on a doctor's prescription during the 4 weeks between the two interviews. The proportion of individuals who had taken or used some medicine which they had obtained without a doctor's prescription was very much greater. It amounted to about two out of every three individuals.

The percentage of males and females at various ages who took any type of medicine during a 4-week period and the percentage of the same groups who took prescribed medicines are illustrated in Fig. 1 (opposite).

Among children, the proportion of boys taking prescribed or non-prescribed medicines did not differ significantly from the proportion of girls. 70 per cent. of the children under 10 years old had been given medicines of some sort, and 21 per cent. of them had taken medicine on a doctor's prescription. Medication was somewhat less frequent among the boys and girls of 10–14 than amongst any other age group. None the less, over 60 per cent. of both sexes took medicines of one sort or another. In the late teens, consumption, particularly of prescribed medicines, declined to a lower level for boys, but rose for girls. Among women aged 20–25 the rise continued, rather over 80 per cent. having taken medicines during the 4-week period, a proportion which varied little in subsequent age groups, although there was a slight tendency for the proportion who took *prescribed* medicines to increase with advancing age. The sex difference in the proportion taking medicines which began to emerge during the teen ages was maintained and indeed increased during early adult life. Only after age 45 did the gap between the proportion of men and women taking medicines, both with and without prescriptions, begin to narrow.

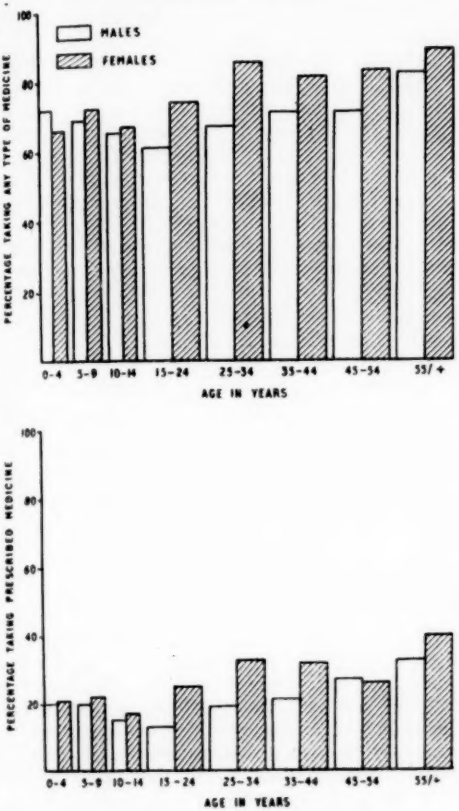


FIG. 1.—Variation with age and sex in the percentage taking any type of medicines and in the percentage taking prescribed medicines.

Those age and sex groups with a high consumption of prescribed medicines were also those with high average rates of general practitioner consultation and *vice versa*; at the same time, variations with consumption of medicines of both types ran parallel to variations in the number of illnesses reported by the individuals concerned as being present at some-time between the two interviews. The proportion of these illnesses for which some medicine was taken was 41 per cent., and this proportion did not vary significantly with age or sex.

RELATIONSHIP OF SELF-MEDICATION TO DOCTOR CONSULTATIONS.—It could be supposed that given illness, pain, or discomfort, self-medication is primarily an alternative to consulting a doctor. If this were so, at a given level of reported illness, persons with a higher level of self-medication would have a lower average rate of G.P. consultations and vice versa. In practice, however, there was no such division. The relationships are illustrated in Table I, which compares the average annual G.P. consultation rates of those taking different numbers of types of self-prescribed medicines, further sub-divided into those reporting different numbers of present or recurring illnesses at the first interview. Our data indicated that adults who took one or more types of self-prescribed medicines during the 4-week period had rather higher average annual G.P. consultation rates than those with a similar number of illnesses who took no self-prescribed medicines. For children the pattern was similar but less consistent, giving no indication that self-medication and G.P. consultations were alternative rather than supplementary ways of responding to illness.

The relationship between illness and the consumption of medicines is further elucidated by the figures in Table II (overleaf). Non-prescribed medicines were consumed by about three out of ten of the adults and four out of ten of the children who claimed that they had had no illness or symptom

TABLE I

THE RELATIONSHIP BETWEEN NON-PRESCRIBED MEDICATION, DOCTOR CONSULTATION, AND ILL-HEALTH

Average yearly G.P. consultation rate

No. of Non-prescribed Medicines consumed in 4 Weeks*	Adults				Children			
	No. of Self-reported Illnesses				No. of Illnesses reported for Child by Mother			
	0	1	2	3 or More	0	1	2	3 or More
None	1·3 (63)	2·7 (88)	3·2 (58)	4·7 (125)	3·0 (123)	2·7 (93)	4·2 (51)	4·1 (35)
One	1·8 (59)	2·8 (68)	4·1 (93)	5·3 (169)	2·4 (79)	3·8 (88)	4·0 (62)	4·5 (54)
Two or More	1·8 (59)	3·1 (37)	3·7 (53)	5·2 (248)	2·8 (46)	2·9 (63)	4·8 (50)	5·5 (47)

* Types not necessarily actual numbers of medicaments.

Figures in brackets indicate the numbers on which the averages are based.

during a 4-week period. It would seem that the habit of prophylactic "dosing" is widespread, especially where children are concerned.

TABLE II

RELATIONSHIP BETWEEN NUMBER OF ILLNESSES REPORTED DURING A MONTH AND THE CONSUMPTION OF MEDICINES WITH AND WITHOUT A PRESCRIPTION

Persons	No. of Illnesses during Month	No Prescribed Medicines		Some Prescribed Medicines	
		Percentage taking some Self-prescribed Medicines	No. of Individuals (=100 per cent.)	Percentage taking some Self-prescribed Medicines	No. of Individuals (=100 per cent.)
Adults	0	29	181	—	—
	1	53	235	43	44
	2	72	207	66	95
	3	80	158	73	69
	4 or more	88	223	89	185
Children	0	39	278	—	—
	1	65	268	59	70
	2	75	187	67	60
	3	80	120	84	74
	4 or More				

The theory that a person who consulted his doctor and was given a prescription for one item would also ask for and obtain prescriptions for other items that he might otherwise have bought without a prescription is not substantiated by the data in Table II. Among people reporting a similar number of illnesses in a particular period, self-medication was only slightly less common for those consuming some medicine on a prescription than it was for those taking no prescribed medicines. Nearly nine out of ten adults reporting four or more illnesses were consuming some non-prescribed medicines whether or not they were also taking prescribed medicines.

SOME SOCIAL CHARACTERISTICS OF THOSE TAKING ANY TYPE OF NON-PRESCRIBED MEDICINE

(*a*) *Children.*—Many of the distinguishing characteristics of families and individuals which may have some association with a tendency to give children medicines without a doctor's prescription are themselves related. For example, there is a relationship between family size and mother's age, between size of family and father's occupation and social class grading, between type and length of formal schooling and social class. Unfortunately, the numbers in our sample were not sufficient to allow us to sort out the individual relationship of each of these characteristics to medication. The associations which medication was found to have with single social characteristics, therefore, may be indirectly rather than directly established. Nevertheless, their elucidation is of value in providing some indication of the likely range of social differences between those who give or do not give non-prescribed medicines to their children.

Although the differences were not startling, children in larger families tended to be given fewer medicines without prescriptions than did children in families with one or two children. Table III shows the relationship between size of family and medication for children aged 5 to 9, by way of illustration. Among younger children the differences were a little less marked, and among the 10–14 age group a little more marked. The differences were not found, however, where medication on a doctor's prescription was concerned. Here there was no significant variation with size of family.

TABLE III

SIZE OF FAMILY AND AMOUNT OF MEDICATION CHILDREN AGED 5–9

Size of Family			1	2	3	4+
Percentage given Medicines	Prescribed	0	83	79	78	80
		1 or More	17	21	22	20
	Non-Prescribed	0	27	36	34	37
		1	30	30	43	38
		2	17	24	12	19
		3 or More	26	10	11	6
No. in Sample (=100 per cent.)			30	131	150	128

Irrespective of size of family, there was also a slight tendency for first-born children to be given more medicines than later-born children. This tendency was noticeable for both prescribed and non-prescribed medicines, and is consistent with the suggestion that the first-born remains the object of more maternal anxiety during school years as well as in the first few years of life than do later-born children. Table IV shows the differences in the medicines given to first and later-born children of 5 to 9 years old.

Father's occupation and mother's education were themselves closely related. It was not, therefore, surprising to find that both these factors were associated with the non-prescribed medication of pre-school children (Tables V and VI). Children under 5 years old, whose fathers were professional or clerical workers, were given non-prescribed medicines more frequently than children whose fathers were manual workers. At the same time pre-school children whose mothers had attended grammar, technical, or private schools were given medicines more often than children whose mothers had ended their scholastic career in elementary or secondary modern schools. The differences were not great, however, and they tended to lessen as the age of the child increased. Indeed, among the 10 to 14-year age group, the association between medication and

TABLE IV

POSITION IN FAMILY AND AMOUNT OF MEDICATION. CHILDREN AGED 5-9 ONLY

Size of Family			One	Two children in family		Three children in family			Four or More children in family		
				Older	Younger	Oldest	Middle	Youngest	Oldest	Middle	Youngest
Percentage given Medicines	Prescribed	0	83	76	81	60	89	81	68	84	79
		1 or More	17	24	19	40	11	19	32	16	21
	Non-prescribed	0	27	33	38	25	32	41	32	42	26
		1	30	31	30	45	45	40	32	35	50
		2	17	21	26	15	10	11	20	19	15
		3+	26	15	6	15	13	8	10	4	9
Numbers in sample (=100 per cent.)			30	58	73	40	47	63	19	75	34

TABLE V

CHILDREN'S MEDICATION AND MOTHER'S EDUCATION

Child's Age (yrs)		Under 5		5–9		10 or More	
Mother's Education		Modern or Elementary	Other	Modern or Elementary	Other	Modern or Elementary	Other
Percentage given Medicines	Prescribed	22	12	22	16	18	15
	Non-prescribed	58	72	63	72	57	67
Nos. in Sample (=100 per cent.)		196	50	286	99	219	55

TABLE VI

CHILDREN'S MEDICATION AND SOCIAL CLASS OF FATHER'S OCCUPATION

Children's Age (yrs)		Under 5			5–9			10–14		
Father's Occupation		Non Manual (1)	Skilled Manual (2)	Semi and Unskilled (3)	Non Manual (1)	Skilled Manual (2)	Semi and Unskilled (3)	Non Manual (1)	Skilled Manual (2)	Semi and Unskilled (3)
Percentage given Medicines	Prescribed	23	20	15	22	21	13	22	14	19
	Non-prescribed	66	62	54	59	66	62	51	60	62
Nos. in Sample (=100 per cent.)		35	175	39	58	255	63	51	158	52

(1) Corresponds to the Register General's Social Classes I, II, and III (c)
(2) Corresponds to the Register General's Social Classes III other than (c)
(3) Corresponds to the Register General's Social Classes IV and V.

father's occupation disappeared and that between mother's education and medication, although still significant statistically (5 per cent. level), was very small.

There is also some indication that, for children aged 5 years or more, those whose mothers worked full-time were given prescribed medicines less often than children whose mothers worked part-time or not at all (Table VII). This is consistent with our previous finding (Cartwright and Jefferys, 1958), that the former group of children consulted their general practitioner less frequently than the latter group.

TABLE VII

CHILDREN'S MEDICATION AND MOTHER'S EMPLOYMENT

Child's Age (yrs)		Under 5		5–9			10 or More		
Mother's Employment		Full or Part-time	None	Full-time	Part-time	None	Full-time	Part-time	None
Percentage given Medicines	Prescribed	24	19	10	22	21	12	15	20
	Non-prescribed	59	62	52	62	68	48	66	59
Nos. in Sample (=100 per cent.)		29	219	40	105	238	52	91	128

One finding which was not related to those surrounding father's occupation, mother's work, or size of family was that children whose mothers stated that they themselves suffered from "nerves" were given several types of medicine more often than children whose mothers did not report nerves. This finding (Table VIII) applied, however, only to children in age groups under 10 years; it did not apply to secondary school children. Moreover, there was no distinction at any age in the proportions of children with or without "nervous" mothers who were given prescribed medicines.

It is also not surprising that the children with mothers who expressed some anxiety about their family's health were more frequently given medicines than those whose mothers did not worry about their family's health (Table IX). There was not, however, a consistent pattern of difference between the children of those who worried much and those who worried little. Children in households possessing thermometers were also more frequently takers of medicine without prescriptions than were children in households not possessing thermometers. And, finally, mothers who took medicines themselves gave more to their children than did the mothers who did not take medicines (Table X).

Other factors which it was considered might show some relationship to giving children non-prescribed medicines were investigated without definite result. Among such factors were the age of the mother and the size of her own family of origin.

Our main conclusion where children were concerned, therefore, was that there were two general types of factor involved. On the one hand, there seemed to be some genuine differences between fairly distinct social groups in this community. The

TABLE VIII

CHILDREN'S MEDICATION AND MOTHER'S "NERVES"

Child's Age (yrs)			Under 5		5–9		10 or More	
Mother's "Nerves"			With	Without	With	Without	With	Without
Percentage given Medicines	Prescribed	0	81	80	78	81	80	84
		1 or More	19	20	22	19	20	16
	Non-prescribed	0	33	41	32	36	36	42
		1	33	35	30	38	43	37
		2 or More	34	24	38	25	21	21
Nos. in Sample (=100 per cent.)			67	185	117	277	100	187

TABLE IX

CHILDREN'S MEDICATION AND MOTHER'S WORRY ABOUT FAMILY HEALTH

Child's Age (yrs)			Under 5			5–9			10 or More		
Mother's Worry about Health			Much	Little	Not Worried	Much	Little	Not Worried	Much	Little	Not Worried
Percentage given Medicines	Prescribed	0	76	79	84	73	78	84	79	85	87
		1 or More	24	21	16	27	22	16	21	15	13
	Non-prescribed	0	24	24	47	30	23	43	36	34	47
		1	37	33	33	35	50	33	42	40	34
		2 or More	39	38	20	35	27	24	22	26	19
Nos. in Sample (=100 per cent.)			70	71	152	130	94	212	113	73	128

TABLE X

RELATIONSHIP BETWEEN CONSUMPTION OF NON-PRESCRIBED MEDICINES BY CHILDREN AND THEIR MOTHERS
(Percentages)

Child's Age (yrs)	Under 5				5–9				10 or More			
Number of Non-prescribed Medicines Consumed by Child	Number of Non-prescribed Medicines Consumed by Mother											
	0	1	2	3+	0	1	2	3+	0	1	2	3+
None	47	49	25	20	45	39	33	23	47	41	41	30
One	32	31	35	39	38	35	33	37	31	45	36	36
Two	13	16	32	26	13	15	23	23	15	11	16	15
Three or More	8	4	8	15	4	11	11	17	7	3	7	19
No. in Sample (=100 per cent.)	60	99	60	39	96	145	84	71	71	109	56	47

children of black-coated workers, whose mothers more frequently had an education beyond the minimum provided at secondary modern or elementary schools and whose families were, on average, smaller than those of manual workers, were more likely to be given medicines than were the children of less well-educated mothers and of manual workers. On the other hand, it was also possible to distinguish children by the mother's attitude towards health problems. The "nervous" mother, worried about her own health and that of her family, was more likely to include a thermometer in the household equipment and to give medicines to her children. These more personal attributes and the less personal distinctions of social grouping may, of course, be related. Indeed, it is likely that ideas and customs of different social groups concerning family size, care of children's health, and a host of attitudes to other aspects of family life and social behaviour are inextricably interwoven.

(*b*) *Adults.*—Our attempts to find any distinguishing characteristics of the adult men and women who took self-prescribed medicines as compared with those who did not were singularly unsuccessful.

Taking the male tenants of the dwellings in our sample, we looked at such differences in their social background as the region of the country in which they were brought up, their father's occupational class, and their own educational achievement. In no instance, however, were such differences significantly related to differences in self-medication. Where women were concerned, we chose to examine the experience of the wives of tenants. Here, too, we failed to discover any distinguishing features of their social background which could be related to self-medication habits.

(2) Medicines Taken and the Conditions for which They were Taken

Hitherto the discussion has concerned the characteristics which distinguish those who took or did not take medicines of any kind during a 4-week period. In this section the actual types of medicine consumed and the conditions for which they were taken are examined.

The proportions of adults and children taking different types of medicine during a 4-week period are shown in Table XI.

Four out of ten adults had taken some form of aspirin or pain-relieving powder without a prescription, and the corresponding proportion for children was 22 per cent. A quarter of the children had been given laxatives during this time, but apparently none of this medication was prescribed. Other medicines which were fairly frequently given to children without a prescription were throat and cough medicines or sweets. Adults took laxatives rather less frequently than the children but they took more health salts and indigestion remedies.

Table XI

Percentage of Adults and Children taking Different Types of Medicines during a 4-week Period

Type of Medicine	Adults %		Children %	
	Prescribed	Non-prescribed	Prescribed	Non-prescribed
Aspirin or other pain relieving powders	3	39	1	22
Laxatives	1	16	—	26
Health salts	—	13	—	5
Throat or cough medicines, sweets or syrups	3	9	5	10
Skin ointments	3	6	2	6
Indigestion remedies	2	7	—	1
Embrocation or ointment to rub in	3	5	1	5
Inhalants or things to sniff up your nose	3	5	3	3
Vitamin tablets or medicinal foods	2	6	1	8
Antiseptics, gargles, mouth washes	—	7	—	4
Surgical clothing, appliances or foot wear	5	1	1	—
Tonics or syrups	2	2	1	7
Eye lotions or eye ointments	1	3	1	2
Sedatives and sleeping tablets	3	1	—	—
Corn pads or anything for feet	—	3	—	—
Other medicine, pills, ointment	11	4	8	4
Number of Individuals (= 100 per cent.)	1,399		1,056	

People sometimes failed to classify their prescribed medicines, so that the proportion of particular types of medicines that was prescribed is likely to be underestimated from these figures. Among the preparations which were classified and said to have been given on a prescription, the types most frequantly mentioned were throat or cough medicines for children and surgical appliances and footwear for adults. Both the groups of medicines, aspirins and laxatives, which were taken by comparatively large proportions of the sample appeared to be taken almost exclusively on the initiative of the individual, the doctors prescribing only a small proportion of these medicaments. In contrast they prescribed more than three-quarters of the medicines which the people interviewed described as sedatives or sleeping tablets, and 84 per cent. of the surgical clothing, appliances, or footwear worn by the adults.

TABLE XII

CONDITIONS FOR WHICH DIFFERENT TYPES OF MEDICINES WERE TAKEN BY ADULTS

Disease	Percentage of Cases of Each Disease for which Some Medicine was taken	Percentage of All Medicines Taken for Each Condition which were Prescribed	No. of Adults reporting Conditions as Present during period	Type of Medicine most Frequently Taken
Tuberculosis	33	46	46	Vitamin tablets
Asthma	75	60	20	Inhalants, throat tablets, others
Obesity	38	*	29	Others
Anaemia	57	52	28	Vitamin tablets, aspirins, others
Psychoneurosis and other mental disorders	48	*	25	Aspirins
Nerves	28	36	151	Aspirins, tonics, sedatives
Worry, depression	16	*	31	—
Eye strain	21	24	111	Eye lotions, aspirins
Eye diseases	31	41	68	Eye lotions, aspirins
Deafness	9	*	47	Surgical appliances
Ear diseases	30	*	27	Others
Heart symptoms	12	*	41	—
Heart troubles	50	77	30	Others
Varicose veins	14	64	168	Surgical appliances
Haemorrhoids	31	14	67	Laxatives
Colds	53	13	259	Aspirins, throat tablets, inhalants
Catarrh	28	33	148	Throat tablets, inhalants, aspirins
Cough	29	12	82	Throat tablets
Tonsillitis, sore throats	71	35	48	Throat tablets, mouth washes, aspirins, inhalants
Bronchitis	61	30	66	Throat tablets, aspirings, embrocations, inhalants
Respiratory symptoms	18	*	22	Embrocations
Other diseases of respiratory system	67	41	42	Aspirins, throat tablets, others
Diseases of teeth	31	21	178	Aspirins, mouth washes
Dysentery, diarrhoea	33	31	40	Indigestion remedies, others, aspirings
Constipation	80	11	132	Laxatives, health salts
Indigestion	70	10	106	Indigestion remedies
Stomach pains and disorders	26	48	42	Others, indigestion remedies
Stomach ulcers	70	*	20	indigestion remedies, others, laxatives
Menopausal symptoms	46	48	41	Aspirins, sedatives
Disorders of menstruation	45	16	87	Aspirins
Other women's complaints	33	*	24	Aspirins
Boils, cellulitis	54	50	74	Skin ointments, others, vitamins
Dermatitis, eczema, pruritis	61	34	80	Skin ointments
Corns	52	6	68	Corn pads
Arthritis	41	55	29	Embrocations, aspirins
Rheumatism	39	34	188	Embrocations, aspirins, health salts, others
Painful and swollen joints	5	—	21	—
Bunions, flat foot, foot troubles	16	*	47	Corns pads, surgical appliances
Synovitis, slipped disk	29	87	38	Surgical appliances
Headaches, migraine	81	9	282	Aspirins, health salts, indigestion remedies, others
Dizziness, tiredness	17	50	120	Tonics, vitamin tablets
Sleeplessness	34	44	50	Sedatives, aspirins
Breathlessness	7	*	55	—
Backache	19	*	63	Embrocations, aspirins
Accidents	37	29	144	Embrocations, skin ointments, aspirins, others
Disabilities	15	*	39	Surgical appliances
Vague aches and pains	22	*	36	Embrocations
Others	48	44	217	
All Illnesses	42	30	3,777	

* Numbers insufficient

The conditions for which medicines were taken and the proportion of sufferers who took medicines are shown for adults in Table XII (opposite) and for children in Table XIII.

These Tables also give the proportion of medicines, taken for any given condition, which was prescribed. The figures relate to conditions or illnesses said to have been present in the interval between our two interviews.

The proportion of adult sufferers from a particular condition who took some kind of medicine for it was relatively high (70 per cent. or more) for headaches, constipation, sore throats, indigestion, and ulcers—all conditions for which some relief from symptoms can be obtained by fairly specific measures. In contrast, less than one in five of those adults with conditions such as breathlessness, dizziness, backache, and varicose veins were receiving any pharmaceutical treatment for these conditions. Surprisingly low, in view of widespread advertizing, was the proportion taking remedies for coughs or catarrh. Nearly twice the proportion, however, took remedies for colds, and the difference may arise from the fact that a high proportion of those with coughs and catarrh attributed these conditions to smoking. Presumably, therefore, in contrast to colds, coughs were mainly regarded as concomitants of smoking which could not be ameliorated by taking pharmaceutical products.

Among adults, the proportion of medicines taken for each condition which had been prescribed was less than 15 per cent. for headaches (9 per cent.), constipation (11 per cent.), indigestion (10 per cent.), colds (13 per cent.), cough (12 per cent.), and piles (14 per cent). Such figures do not suggest that many people are prepared to spend time in the doctor's waiting room in order to obtain for a shilling items which they could prescribe and purchase for themselves. Indeed, the relatively small proportion of all medicines which were prescribed for conditions such as asthma, arthritis, rheumatism, stomach ulcers, and anaemia suggests a fairly widespread use of advertised patent remedies, and possibly a disquieting failure to seek medical advice and pharmaceutical treatment under the National Health Service.

The type of medicine most frequently taken for the different conditions is shown in the final column of Table XII. Aspirins and other pain-relieving powders were certainly regarded as the most catholic of

TABLE XIII

CONDITIONS FOR WHICH DIFFERENT TYPES OF MEDICINES WERE TAKEN BY CHILDREN

Disease	Percentage of Cases of Each Condition for which Some Medicine was Taken	Percentage of All Medicines taken for Each Condition which were Prescribed	No. of Conditions reported as Present during Period
Nerves, Mental disorders	6	*	121
Squint	9	*	44
Eyestrain	30	*	20
Ear troubles	50	59	34
Colds	60	17	240
Catarrh	42	27	71
Cough	67	19	27
Sore throats	78	35	49
Bronchitis	73	40	40
Pneumonia, Influenza	74	61	31
Diseases of teeth	25	16	135
Diarrhoea, vomiting	40	*	30
Constipation	94	6	31
Stomach upsets	31	*	36
Kidney trouble, etc.	14	*	21
Skin troubles	51	39	109
Foot troubles	12	*	26
Headaches	69	6	49
Undue tiredness, loss of weight	19	*	27
Loss of appetite	6	*	53
Accidents	40	18	133
Disabilities; congenital malformations	—	*	26
Others	42	51	209
All Diseases	41	31	1,562

* Numbers insufficient

remedies. They were taken for arthritis and anaemia, bronchitis and backache, menstrual disorders and menopausal symptoms, nerves and neuritis, influenza and insomnia, colds and catarrh, and, of course, for headaches and rheumatism.

Compared with adults, there was less medication of children suffering from headaches and nerves, both of which are conditions most commonly treated with aspirins. There was, however, a great similarity between adults and children in the size of the prescribed proportion of remedies taken for any given condition.

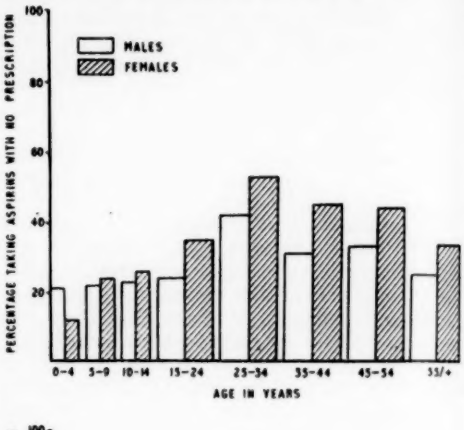
Taking an overall view of the consumption of medicines, although much self-prescribing, particularly of aspirins and laxatives, went on amongst the population of this housing estate, there were even larger numbers of persons suffering from one or other morbid condition who neither prescribed for themselves, nor had the doctor prescribe for them. Medicines were taken for only four-tenths of the illnesses reported for both adults and children in a 4-week period.

Our further analysis, therefore, was concerned with discovering whether there were any differences in the social or health characteristics of those who were consumers of aspirins and laxatives and those who were not.

Consumers of Aspirins and Laxatives

The practice of taking aspirins or other pain-relieving powders was most widespread among adults in their thirties, particularly amongst women. It was also more common among women than among men at all ages from 10 years upwards. No fewer than 53 per cent. of the women aged 25–34 had taken aspirins within the 4-week period covered by our two interviews. Where laxatives were concerned, however, the age pattern was reversed. Relatively larger numbers of the very young and of the elderly than of the young adults took laxatives, and, at all ages, more women than men were consumers. The proportions of each of the age groups into which our sample was divided who took aspirins and laxatives are shown in Fig. 2.

Among children, those in larger families had less often been given aspirins than had those in small families. Laxatives, on the other hand, seemed to be given with about the same frequency in large and small families. These findings are shown in Table XIV. The proportions within the 5–9 and 10–14 age groups are consistent with the recent findings in Buckinghamshire of Reid (1956), who reported that



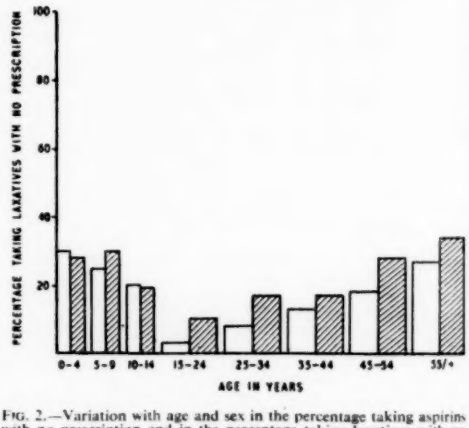


FIG. 2.—Variation with age and sex in the percentage taking aspirins with no prescription and in the percentage taking laxatives with no prescription.

TABLE XIV

CONSUMPTION OF LAXATIVES AND ASPIRINS BY CHILDREN, BY SIZE OF FAMILY

Size of Family	Age of Child (yrs)	Percentage taking Laxatives	Percentage taking Aspirins	No. of Children (=100 per cent.)
One	Under 5	35	22	49
	5–9	30	53	30
	10 or More	*	*	15
Two	Under 5	29	17	83
	5–9	21	21	131
	10 or More	16	23	94
Three	Under 5	23	19	88
	5–9	32	23	150
	10 or More	19	26	104
Four or More	Under 5	33	11	80
	5–9	29	18	128
	10 or More	21	22	105

* Number insufficient.

21·6 per cent. of 5-year-olds and 12·9 per cent. of 15-year-olds were taking laxatives regularly once or more a week.

When the father's social class was considered, it was found that the children of skilled manual workers were most frequently given laxatives, and that this form of medication was least common among the children of non-manual workers (Table XV). This latter group of children, however, was more likely, when they were under 10 years old, to be given aspirins than children whose fathers were manual workers.

TABLE XV

CONSUMPTION OF LAXATIVES AND ASPIRINS BY CHILDREN, BY SOCIAL CLASS OF FATHER'S OCCUPATION

Social Class of Father's occupation	Age of Child (yrs)	Percentage taking Laxatives	Percentage taking Aspirins	No. of Children (=100 per cent.)
I, II, IIIc Non-Manual ..	Under 5	17	37	35
	5–9	10	31	58
	10 or More	6	20	52
III Other Skilled Manual ..	Under 5	32	14	175
	5–9	32	24	255
	10 or More	20	22	158
IV, V Semi-Skilled and Unskilled Manual	Under 5	15	5	39
	5–9	21	19	63
	10 or More	17	27	52

Younger mothers on the estate were no more nor no less inclined to give their children laxatives than were older mothers with children of the same age; but further evidence from other areas is needed before this finding could be interpreted as meaning that there is no sign of a general tendency to dose children less.

Bringing together the information on self-reported illnesses or symptoms and that concerning the taking of laxatives, it is apparent that most of the laxatives were given to children for prophylactic purposes and not in order to cure actual constipation or upsets of the digestive system.

At our first interview with the mothers, only thirty children were alleged by mothers to be subject to recurrent constipation or to be suffering from it at the time. At the second interview, an additional seventeen children had had a bout of constipation in the previous 4 weeks. Of the combined total of 47 children with constipation, however, only 28 had been given a laxative. At the same time 271 children had been given laxatives during the 4-weeks preceding our second interview. In other words, only about 10 per cent. of all those who were given laxatives, took them for remedial purposes. Over 90 per cent. of the children were given them, we can presume, either because they were considered necessary to prevent constipation or because they were endowed in popular opinion with some health-preserving function.

Among adults, 132 (56 per cent.) of the 238 individuals who took laxatives had suffered from constipation during the 4 weeks preceding our second interview. In other words, just over half of those who took laxatives did so, at least on occasion, for therapeutic purposes and just under half for preventive reasons. It would be interesting to know whether those adults who were constipated (about one in every ten of the adult population) had been more frequently subjected to prophylactic "dosing" in childhood than those adults who were neither constipated nor taking laxatives.

SUMMARY

The available recent information on the consumption both of medicines prescribed under the National Health Service and of those bought without prescription is reviewed. The results of an inquiry, undertaken in 1954–55, in which a sample of the population of a post-war housing estate was asked about the kind of medicines consumed in a 4-week period as well as about illnesses and G.P. consultations, are described.

About a quarter of the sample had taken prescribed medicines in a 4-week period, and about two out of every three had taken non-prescribed medicines. Consumption was higher among women than among men at all ages from 10 years onwards; but the sex differences were greatest between adults aged 25 to 45 years.

Self-medication was not, on the whole, an alternative to G.P. consultation. Among those reporting similar numbers of illnesses, those who took two or more self-prescribed medicines had higher G.P. consultation rates than did those who took none or only one self-prescribed medicine. The majority of those who took medicines prescribed by the G.P. supplemented them with self-prescribed medicines.

Children in smaller families, and particularly the first born, were given more medicines than children in large families or later-born children. Mothers who had an education beyond the minimum provided in elementary and secondary modern schools and wives of black-coated workers gave their children more medicine, both self- and doctor-prescribed, then did the remaining wives and mothers. Mothers who themselves had "nerves",

were anxious about family health, and took medicines themselves, were more likely to give their children medicines than those without these personal characteristics.

Laxatives and aspirins were taken more frequently than any other type of pharmaceutical product. They were almost always self-prescribed. Aspirins were taken for a wide variety of symptomatic conditions. Women, especially those in their thirties and forties, were the biggest consumers of aspirins. They also took laxatives more frequently than men; but the very young and the very old were more often involved than those in the middle years of life.

Among children, those in small families were more often given aspirins; but laxatives were given with about equal frequency in different sized families.

Over 90 per cent. of the children who were given laxatives, took them as a general or specific prophylaxis and not to cure constipation. Among adults, however, 56 per cent. of those taking laxatives said they had suffered from constipation during the 4-week period.

We should like to thank Professor J. M. Mackintosh and Professor W. S. Walton for their support and encouragement. We are also grateful to Mr. S. P. W. Chave and Dr. F. M. Martin for their interest and advice, to the general practitioners of the estate for their assiduous record keeping, to Miss Alice Stephen who did much of the computing, and to the interviewers and office staff, all of whom worked with us and made this study possible.

REFERENCES

Brotherston, J. H. F., Chave, S. P. W., and others (1956). *Brit. J. prev. soc. Med.*, **10**, 200.

Cartwright, A. (1959). *Milbank mem. Fd Quart.*, **37**, 33.

—— and Jefferys, M. (1958). *Brit. J. prev. soc. Med.*, **12**, 159.

Gray, P. G. and Cartwright, A. (1954). *Appl. Stat.*, **3**, 19.

Ministry of Health (1959). "Final Report of the Committee on Cost of Prescribing". H.M.S.O., London.

Ministry of Labour and National Service (1957). "Report of an Enquiry into Household Expenditure in 1953–54". H.M.S.O., London.

Martin, F. M., Brotherston, J. H. F., and Chave, S. P. W. (1957). *Brit. J. prev. soc. Med.*, **11**, 196.

Martin, J. P. (1957). "Social Aspects of Prescribing". Heinemann, London.

Reid, J. J. A. (1956). *Brit. med. J.*, **2**, 25.

Brit. J. prev. soc. Med. (1960), **14**, 77–79

LOCATION OF THE ADVENTITIOUS FACTORS IN HAEMOLYTIC DISEASE OF THE NEWBORN

BY

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It is by now well established that the frequencies of ABO mating types among parents of children with Rh haemolytic disease of the newborn are not the same as in the general population. There is a reduced frequency of matings in which the mother has antibodies to ABO-antigens possessed by her husband. It is possible that incompatible foetal blood escaping into the mother's circulation is so rapidly destroyed that its ability either to sensitize or later to immunize the mother against Rh substance is impaired. Nevanlinna and Vainio (1956) have also shown that within affected families the proportion of healthy children who are incompatible with the mother for the ABO groups is even lower than the proportion of affected ones. They have argued that because, on average, healthy children occur earlier in these families than do affected ones, the protective effect of ABO-incompatibility is chiefly exercised at the stage of sensitization (sensibilization in their terms) rather than during the pregnancy when antibodies are first produced in sufficient quantities to cause disease.

Knox and Walker (1957) constructed an argument based upon the birth rank distribution of affected infants which led to a conclusion in the form of two alternatives. One was complex, requiring an extra genetic determinant, together with a risk of sensitization of the order of 0·39 at each Rh-positive pregnancy, and a similar risk of immunization at each subsequent Rh-positive pregnancy. The other was much simpler (and therefore preferred), requiring no important extra genetic determinants and a single important adventitious factor related to only one of the pregnancies, with a risk of occurrence of 1/17. The method could not distinguish which pregnancy this was.

It has since occurred to us that the protection conferred by ABO-incompatibility, apart from its intrinsic interest, may also be used as a tool to extend our previous argument. For if it can be shown precisely at which pregnancy or pregnancies the protection is conferred, then that also must be the location of an important adventitious factor against which the incompatibility protects.

It is therefore necessary to press the arguments of Nevanlinna and Vainio to a more precise and critical stage; to deduce in detail the expected consequences of the hypothesis they have set up and of alternative hypotheses; to examine the facts in relationship to these deductions. This is the purpose of the present paper.

Hypothetical Deductions

The simplest situation in which we can examine the consequences of different plausible mechanisms of Rh-sensitization and immunization is in families in which the first child is healthy and the second child affected. Obviously, if ABO-incompatibility were irrelevant to the situation, we should expect both first and second children to be incompatible with their mothers in the same proportions as in the population. If incompatibility were relevant in the way Nevanlinna and Vainio suggest, the proportion of incompatible infants should be reduced especially in the first pregnancy, with a limiting value of zero. The proportion in the second pregnancy should also be reduced because of selection of particular parental mating types, but not as low as in the first pregnancy. On the other hand, if ABO-incompatibility exerted a protective effect only in the second pregnancy, these relationships would be reversed with an especially

low frequency of incompatibility in the second pregnancy and a less marked reduction in the first.

Unfortunately, this does not exhaust the possibilities. It may be that incompatibility operates in both situations, in which case we might expect a more equal reduction of frequency in the two situations.

It has not been possible to derive the expected frequencies of ABO-incompatible foetuses for all the mechanisms, but it has been possible to derive those for the limiting cases. These derivations are now presented.

The ABO mating types (ignoring the subdivisions of A) may be put into three classes. These classes may be designated 1, ½, 0, according to the respective probabilities of any particular child being ABO-compatible. The frequencies of individual matings are derived from the products of the parental genotype frequencies (as given by Race and Sanger, 1958), doubling of products when the parents have different genotypes being unnecessary here because we have taken account of maternal and paternal identities.

The summed frequencies of the three classes show that 5·85 per cent. of all matings can never produce an ABO-compatible foetus, while 28·06 per cent. will do so in half of their children. The remaining 66·09 per cent. will always have compatible children. Furthermore, it is simply derived that 80·12 per cent. of all foetuses in the population are compatible with their mothers. This gives the expectation for the null hypothesis; if the ABO groups were irrelevant to the formation of Rhesus antibodies we should expect 19·88 per cent. both of first babies and of second babies in the specified families to be incompatible with their mothers.

The hypothesis suggested by Nevanlinna and Vainio (1956) is that incompatibility at the first of the two pregnancies is protective. In the limiting situation of complete protection we expect the frequency of incompatibility in this pregnancy, in families selected through an affected second child, to be zero. In this event the parental mating types would consist of the following relative proportions:

Type 1	66·09 × 1
Type ½	28·06 × ½
Type 0	5·85 × 0.

This gives absolute proportions of 82·49 per cent. Type 1 and 17·51 per cent. Type ½. The second babies consequently will be incompatible and compatible in the proportions 8·76 per cent. and 91·24 per cent.

The antithesis of this hypothesis is that ABO-incompatibility protects only at the second pregnancy. In this case, the reasoning is a mirror image of that already presented, the expected proportions of incompatible foetuses being zero in the second pregnancy, 8·76 per cent. in the first.

The hypothesis that complete protection occurs in both pregnancies clearly results in zero incompatibility in each situation. Heterogeneity, in the sense that some families are protected in one manner, others in another, others not at all, will result in proportions which are mixtures of the results for individual hypothetical mechanisms.

The four main hypotheses, the limits of a variety of possible ones, are presented in the Table.

TABLE

EXPECTED PROPORTIONS (PER CENT.) OF ABO-INCOMPATIBLE FOETUSES IN FIRST AND SECOND PREGNANCIES, WHERE THE SECOND CHILD HAS HAEMOLYTIC DISEASE OF THE NEWBORN

Hypothesis	First Children	Second Children
No protection from incompatibility ..	19·9	19·9
Full protection at first pregnancy only ..	0	8·8
Full protection at second pregnancy only	8·8	0
Full protection when either pregnancy is incompatible	0	0

OBSERVATIONS

(*i*) Almost all infants with haemolytic disease of the newborn in the Newcastle area are treated in this Department, and in the period 1948 to 1958 we have records of 331 babies who were the second baby in their families and the first affected, and for whom we knew the ABO groups of both the baby and its mother. Of these 331, thirty (9·06 ± 1·58 per cent.) were incompatible.

(*ii*) We knew the ABO group of the first child also in some of these families, but since our data were not complete we could not be certain that selection in terms of some relevant variable had not taken place. We wrote, therefore, and asked all those mothers who lived within a reasonable distance and whose record was incomplete, if they would attend with the older child. In this way we collected a sample of data which we suppose not to be substantially biased, although some failed to attend.

Of 71 children in this sample, three (4·2 per cent.) were incompatible.

By adding first children whose blood groups were known previously and who lived outside the area of

the supplementary survey, we have four of 99 (4 per cent.) incompatible. Since the addition has not materially altered the result it is probably valid to use all the information.

Discussion

The proportion of incompatibles is significantly less than in the general population both at the first and at the second pregnancy, confirming that protection occurs. The proportion is lower at the first pregnancy than at the second, suggesting that protection occurs especially at the stage of sensitization, but the difference is not statistically significant and the protection is obviously not complete.

However, with four of 99 first children incompatible, we can say that the proportion is less than the minimum expected for full protection at the second pregnancy to a degree which approaches statistical significance ($\chi^2_{(1)} = 2{\cdot}87$, $P < 0{\cdot}1, \ldots$ or $P < 0{\cdot}05$ on a single tail test), and that it is quite certainly less than the proportion expected for any degree of protection at the second pregnancy which would be consistent with an observed incompatibility rate there of 9·06 per cent.

On the other hand, the degree of protection necessary at the first pregnancy in order to produce an incompatibility rate of 9·06 per cent. among affected second babies is consistent with the findings at the first pregnancy. It is true that the proportion of incompatibles at the first pregnancy is somewhat higher than might have been expected having regard to the proportion at the second and that it is possible that there is some protection at the immunization stage also. But this cannot be great, and most if not all of the protection appears to be conferred at the stage of sensitization.

The proportion of incompatibles at the first pregnancy suggests that an ABO-incompatible Rh-positive foetus carries about 20 per cent. of the normal risk of sensitizing an Rh-negative mother. This corresponds with the estimate reached by Nevanlinna and Vainio (1956). The proportion of incompatibles at the second pregnancy suggests that the risk is somewhat smaller and seems to indicate that 20 per cent. must be near the upper limit.

For the purposes of our present thesis and the extension of our previous argument, it is to be concluded that important unknown adventitious factors, which determine that one woman becomes immunized while another does not, are chiefly concentrated at the sensitization stage, and that when she embarks upon the next Rh-positive pregnancy the outcome in terms of immunization is already decided.

Summary

Previous work has suggested that ABO-incompatibility of husband and wife may protect against Rhesus immunization of the wife. It has also been shown that, besides this incompatibility effect, important unknown adventitious factors are at work to determine whether immunization occurs. It is argued that the timing of the protective effect, which can be inferred, can be used to identify the location of the adventitious factors. It is shown that ABO protection occurs at the stage of sensitization and inferred that the adventitious factors must operate here also.

References

Knox, G., and Walker, W. (1957). *Brit. J. prev. soc. Med.*, **11**, 126.
Nevanlinna, H. R., and Vainio, T. (1956). *Vox Sang. (Basel)*, **n.s.1**, 26.
Race, R. R., and Sanger, R. (1958). "Blood Groups in Man", 3rd ed. Blackwell, Oxford.

Addendum

Since submitting this paper we have re-examined the four families where the first child was ABO-incompatible. The ABO and Rh groups were all confirmed, but one case was found not to be a case of Rh isoimmunization. The diagnosis had been accepted originally upon a doubtful result since a request for further blood samples had not been met; the error was due to cold agglutinins. This strengthens our conclusions, but we have not re-analysed our data since this would not be legitimate without serological re-examination of all cases.

Another of the four children was stillborn, but we examined the ABO secretor status of the other two. One was a secretor and the other was not. There is no evidence here that the secretor status might explain the occurrence of exceptional sensitizations in the presence of incompatibility.

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PREMATURE BIRTH AND SUBSEQUENT ADMISSION TO HOSPITAL

BY

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It is recognized that premature birth is a major factor in neonatal mortality, and that prolonged care of such cases in new-born nurseries or premature units is advisable. There is also a growing realization that premature babies who are eventually discharged from the units remain handicapped for some months, possibly years, presumably because they are weaker than average and more susceptible to disease, especially infection. Certainly large numbers of children admitted to the paediatric wards of the Rothschild Hospital in Haifa weighed less than 2,500 g. at birth, and the object of the present investigation was to discover the strength of the association between these low birth weights and subsequent admission to this hospital. The problem demands a "longitudinal study", with detailed follow-up of babies after their discharge from premature units; however, an assessment of the frequency of low birth weight among infants admitted to a paediatric department which serves the general community provides a relatively simple and rapid method of measuring the association between premature delivery and subsequent ill-health, provided, as is the case in Israel, few children die outside hospital and the vast majority of serious childhood diseases are treated in hospital. By repeating such an investigation at regular intervals, it would also be possible to discover if the special needs of premature babies are being met by existing health and welfare services. So far as we are aware, this is the first "cross-sectional" study of the problem to be reported.

In the following account, the birth weights of 998 children admitted to the Paediatric Department of the Rothschild Hospital will be examined.

Material and Plan of Study

The case-sheets of 998 consecutive admissions of children between the age of one month and 2 years during the period 1954–58 were collected. The birth weights, sex, death rates, and maturity status (above or below 2,500 g.) of these children are given in Table I. The age at admission is recorded in half-years. No child under the age of one month was included because this is a period of exceptionally heavy mortality among premature babies. The discharge diagnoses of these children are given in Table II, and re-admissions in Table III. As the families from which prematures and full-term children were derived presented no great differences in socio-economic status, this will not be considered

Results

Table I shows that 16·7 per cent. of the 998 patients admitted were ex-prematures, this percentage reaching 20·8 per cent. for those between 1 and 6 months old. The overall mortality rates for the premature and full-term children were the same (6·4 per cent.), but for children admitted at the age of 1 month to 1 year they were slightly higher for the prematures (7·8 per cent.) than for the full-term children (5·3 per cent.). No significant difference was noted in the distribution by age at admission of the two birth-weight groups of prematures, but 45 per cent. of the full-term admissions were females, as compared with 50 per cent. of the prematures.

TABLE I

DETAILS OF 998 CONSECUTIVE ADMISSIONS OF CHILDREN BETWEEN 1 AND 24 MONTHS OF AGE

Age at Admission (mths) ..		1–6	7–12	13–18	19–24	Total
Maturity Status at Birth	Premature ..	103	43	11	10	167
	Full-term ..	391	253	122	65	831
Death in Hospital	Premature ..	8	3	—	—	11
	Full-term ..	21	13	4	1	53
Weight at Birth (prematures only) (g.)	Under 2,000	21	10	1	2	34
	2,000–2,500	82	33	10	8	133
Males	Premature ..	54	18	6	6	84
	Full-term ..	229	136	62	30	457

The reasons for admission are stated in Table II, where it will be seen that deficiency conditions (mainly rickets, anaemia, and malnutrition) were more frequent among prematures (43·1 per cent.) than among full-term children (25·1 per cent.). Re-admission (Table III) was more frequent among prematures than full-term children, and the excess was greatest among the children who were first admitted at the age of 1 to 6 months.

TABLE II

DISTRIBUTION OF MAJOR DISEASE GROUPS

Diagnostic Groups	Prematures		Full-Term Children	
	No.	Per cent.	No.	Per cent.
Diarrhoea	96	57·5	412	49·5
Respiratory Infection	91	54·5	394	47·4
Otitis Media	37	22·1	138	16·6
Deficiencies (Rickets, Anaemia, etc.)	72	43·1	209	25·1
Other Infections	14	8·4	116	14·0
External Causes (Accidents, etc.)	2	1·2	48	5·8
Congenital Defects	18	10·8	75	9·0
Observation	16	9·6	64	7·7
Miscellaneous	6	3·6	48	5·8
Total Diagnoses	352	—	1,488	—
Total No. of Children	167	100·0	831	100·0

TABLE III

RE-ADMISSIONS TO HOSPITAL OF PREMATURE AND FULL-TERM BABIES

Age at First Admission (mths)	Re-admissions			
	Prematures		Full-Term Children	
	No.	Per cent.	No.	Per cent.
1–6	31	30·0	59	14·7
–12	19	44·1	75	29·0
–18	5	45·4	35	28·2
–24	5	50·0	24	36·3
Total Re-admissions	60	35·9	193	22·7
Original No. of Children	167		831	

DISCUSSION

Recent surveys have shown that the percentage of premature births in Israel has ranged from 4·7 to 7·1 (Halevi, 1959), and the relatively high neonatal death-rate among prematures has probably reduced the percentage of prematures over the age of one month in the community to well below 7 per cent. It follows from this that the morbidity experience of our premature group has been unduly great, especially in the first half-year of life, where prematures represented 20·8 per cent. of all such admissions.

The absence of significant differences in mortality rates in the two groups suggests that the illnesses acquired by prematures were no more dangerous to them than to full-term children, providing adequate treatment was given. Most illnesses requiring admission to hospital were infectious in origin, but there is no evidence that in this respect the premature children were at a disadvantage when compared with full-term children.

The high proportion of prematures with birth weights between 2,000 and 2,500 g. suggests that even babies who are only slightly underweight at birth retain a health handicap for prolonged periods.

It is common experience that male admissions to paediatric wards outnumber female admissions (Poulton, 1923; Tisdall, Brown, and Kelly, 1930), and the equal sex distribution among premature children in the present series is probably due to the greater frequency of low birthweights among females (Halevi, 1959).

The higher incidence of deficiency conditions, especially rickets and anaemia, among prematures was to be expected. However, there was not a significantly greater incidence of respiratory infections in the premature group, as was noted by other authors (Drillien, 1959; Douglas and Mogford, 1953). Otitis media was never a reason for admission in this series.

On so general and important a problem as the health of premature children, the available recent literature is relatively scanty. Drillien (1959) reported an accurate and comprehensive longitudinal study of premature and full-term children and noted that hospital admissions of prematurely-born children during the first 2 years of life were 2½ times higher than those of a control group, and Alm (1953) also found relatively high death rates in prematures during the first 2 years of life. In this study prematures surviving 2 to 3 years showed no difference in the incidence of major disease as compared with mature infants, with the exception of a higher frequency of disorders related to birth injury. Douglas and Mogford (1953) compared the health of premature children with that of full-term controls during the first 4 years of life, and found a much higher incidence of hospital admissions, especially for bronchitis and pneumonia, during the first 2 years of life. These premature children spent on the average 3½ times as many days in hospital during the first 2 years of life as the controls. The average stay

per illness was greater for prematures, and there was also a marked relationship between the birth weight of premature children and the likelihood of their being admitted to hospital, males, both premature and controls, being more likely to be admitted than females, and lung infections being more common among the premature children. Crosse (1954) confirmed the excessive death rate from congenital defects and infections among prematures during the first 2 to 3 years of life and commented on their increased susceptibility to infections during the first 2 years. Perkins (1955) recorded 239 illnesses in a one-year follow-up study of 144 prematures, and 138 of these illnesses were infectious in origin, mainly of the respiratory tract; in this series 27 children were admitted to hospital and 52 per cent. of these illnesses were the results of infection or malnutrition and assumed to be preventable. Of the 212 illnesses not requiring admission to hospital, 55 per cent. (infections, accidents, and malnutrition) were regarded as preventable. Newsom and Pesut (1958) re-examined 280 babies weighing less than 2,000 g. at birth at the age of 1 year, and found a death rate of 5·9 per cent. during the period after discharge from hospital. Levy (1958) reviewed 117 premature infants 10 months after discharge from a premature unit in Israel and discovered that eleven infants had died and 32 others had been admitted to hospital. James (1958) found an excessively high death rate among prematures as compared with full-term infants, and discovered that the chief cause of death was infection. In this series there was a high rate of morbidity during the first 2 years of life and one-quarter of the children in this age group required admission to hospital. The morbidity was highest among children with lower birth weights, and 60 per cent. of the hospital admissions were due to respiratory infections or diarrhoea, with or without anaemia and malnutrition. A further 10 per cent. of the admissions were for accidents, including poisoning.

The present investigation shows that children who are born prematurely represent a high proportion of all children requiring hospital treatment. It is possible that the original requests for their admission were influenced more by the low birth weight than the immediate clinical state, but the numbers are too great to be explained in this way and all the children were re-examined before they were actually admitted to the wards. Naturally, of two "equivalently sick" children, the small one would usually be given priority of admission, but whatever the grounds for requesting or confirming admission, the fact remains that in comparison with their numbers in the general population, prematurely-born children were admitted to hospital more than twice as frequently as full-term children.

The need for further study of the later health of premature infants has been stressed by James (1958), and the present investigation confirms his suspicion that the increased susceptibility of prematures to illness, especially infection, persists at least up to the age of 2 years. Since hospital treatment is expensive and potentially dangerous to young children, the reduction in admissions of prematurely-born children represents a specific challenge in this field. Concentration of child health measures on all prematures throughout the first 2 years of life, possibly by special public health nurses, might reduce appreciably the work of hospital paediatric units and is urgently called for for other reasons.

SUMMARY

Out of 998 children from 1 to 24 months of age admitted to a general paediatric department, 16·7 per cent. had a birth weight of 2,500 g. or less. Up to the age of 6 months the percentage of prematures was 20·8 per cent. These figures are much above the frequency of prematurity in the general community (which is less than 7 per cent.) and show that the premature maintains an increased susceptibility to illness, especially infection, throughout the first 2 years of life. The relation between prematurely-born children and paediatric hospitalization needs is discussed.

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REFERENCES

Alm, I. (1953). *Acta paediat.*, **42**, Suppl. 94, p. 59.
Crosse, V. M. (1954). *Amer. J. Publ. Hlth*, **44**, 1010.
Douglas, J. W. B., and Mogford, C. (1953). *Brit. med. J.*, **1**, 748.
Drillien, C. M. (1958). *Arch. Dis. Childh.*, **34**, 210.
Halevi, H. S. (1959). *Harefuah*, **56**, 205.
James, J. A. (1959). *Pediatrics*, **22**, 154.
Levy, I. (1958). Personal communication.
Newsom, W. T., and Pesut, L. (1958). *Amer. J. Dis. Child.*, **96**, 632.
Perkins, G. B. (1955). *Amer. J. Publ. Hlth*, **45**, 774.
Poulton, E. M. (1950). *Arch. Dis. Childh.*, **25**, 392.
Tisdall, F. F., Brown, A., and Kelly, A. D. (1930). *Amer. J. Dis. child.*, **39**, 163.

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THE FAMILIES OF DULL CHILDREN*

A CLASSIFICATION FOR PREDICTING CAREERS

BY

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Under the Education Act of 1944, children who are backward at school may be referred for a special medical examination and officially "ascertained" as educationally subnormal (E.S.N.). On leaving school, they may be notified to the Local Health Authority and placed under the supervision of the mental health service. Some authorities, believing that these young people are able to manage their own affairs, take no action in such cases, whereas others place nearly all of them under statutory supervision and thus give them the legal status of mental defectives.

The absence of uniformity in dealing with them prompted the present investigation, the purpose of which was to discover whether a grouping of E.S.N. subjects by family circumstances might indicate their real needs.

METHOD

It was decided to follow up a group of subjects who had been ascertained as E.S.N. during their schooldays, and to interview both them and their parents. Additional information was sought from other sources, such as School Welfare Departments, the National Society for the Prevention of Cruelty to Children (N.S.P.C.C.), Children's Departments, Health Departments, Probation Officers, and voluntary agencies.

In the cohort of children born between 1933 and 1937, 319 subjects had been ascertained as E.S.N. in Salford City and Lancashire County. From these individuals, who were aged between 20 and 24 years at the time of the study, a group of 106 was selected at random for investigation. Adequate records were not available for earlier cohorts. Interviews were successfully completed with the parents of all save seven of the subjects. Sufficient information was obtained about all the 106 cases to enable each to be placed in one of the three family groups described below.

FAMILY GROUPS

In making this classification attention was focused on two functions of the elementary family. The first of these is the provision of a set of enduring human relationships and the second the provision by the adult members of basic standards of care for the children.

It was assumed that the first function had been fulfilled if the subject's elementary family group had always included at least one parent or substitute parent until he had reached the age of 10 years. The second function was taken as fulfilled if the family had not been prosecuted by any of three social agencies: the School Welfare and Attendance Office, the N.S.P.C.C., and the Children's Department.

By our criteria, both functions had been fulfilled in 74 families (termed "functioning"), ten families (termed "deviant") had been dealt with by at least one of the three social agencies, and 22 families (termed "dysmorphic") had failed to provide enduring relationships.

RESULTS

I. AT THE TIME OF ASCERTAINMENT

The Subjects

Sex and I.Q. Scores.—There were 68 boys and 38 girls in the survey group. Their I.Q. scores,

* This study was inaugurated by Professor C. Fraser Brockington and sponsored by the National Association of Mental Health and aided by a grant from the Halley Stuart Trust to one of us (Z. A. S.). The Medical Officers of Health of Lancashire County (Dr. S. C. Gawne) and of Salford City (Dr. J. L. Burn) made the survey possible by seconding field workers.

assessed at school on the Terman Merrill test, ranged from 44 to 86, the average for boys being 72 and for girls 64.

When the subjects were divided into the three family categories, the sex and I.Q. distributions of the functioning and deviant groups were found to be alike and to differ from those of the dysmorphic group. Thus in the functioning and deviant groups there were more than twice as many males as females (58 to 26), but in the dysmorphic group females outnumbered males (12 to 10). The average I.Q. for the boys was roughly the same in all three family groups, but for girls it was slightly lower in the functioning and deviant groups than in the dysmorphic group (64 and 68 respectively).

The Families

Social Class (Table I).—In the present series there were no cases from Social Class I and only four from Social Class II. This distribution accords with hospital and other statistics on the feeble-minded (Registrar General, 1958) and on backward children (Burt, 1950). There were fewer fathers in Social Class III than expected, and only three of these were in non-manual occupations.

TABLE I

SOCIAL CLASS AT THE TIME OF ASCERTAINMENT OF THREE FAMILY TYPES (106 Subjects)

Social Class*		Type of Family			
		Functioning	Deviant	Dysmorphic	Total
I		0	0	0	0
II		3	0	1	4
III		15	1	3	19
IV		6	1	0	7
V	Regular Work	47	6	5	58
	Casual or Irregular Labourers	3	2	12	17
	Unknown	0	0	1	1
Total	Males	50	8	10	68
	Females	24	2	12	38
Grand Total		74	10	22	106

* For seven illegitimate subjects, the maternal grandfather's occupation has been used as the index.

Only 4 per cent. of fathers of functioning families were casual or irregular labourers, but the dysmorphic families were weighted in favour of such occupations (55 per cent.). The fathers of deviant families were intermediate between these.

All the families, including those in Social Class II, belonged to working class cultures, and almost all the fathers were in urban employment.

After the time of ascertainment, one deviant family in Social Class III moved down to Class V, and two functioning families moved up to Social Class II from Social Classes III and IV respectively.

Structure (Table II).—67 (90 per cent.) of the children from functioning families and all those from deviant families had always lived with both parents till they reached the age of 10 years.

TABLE II

ELEMENTARY FAMILY STRUCTURE* DURING THE FIRST 10 YEARS OF LIFE (106 Subjects)

Period with Both Parents (yrs)	Type of Family			
	Functioning	Deviant	Dysmorphic	Total
Never	0	0	11	11
Up to 2	2	0	3	5
Up to 5	2	0	7	9
Up to 9	3	0	1	4
10 and Over	67+	10+	0	77
Total	74	10	22	106

* In twenty of these families, the father was away for various periods on war service. In a further seven the subject spent periods in hospital, and in three others he was evacuated.

By definition, no cases from dysmorphic families had lived with parents throughout the whole of this period; eight did so until they reached 5 years of age and a further three until they were 2 years old, and in eleven cases the elementary family was never established. After an initial break-up of family life, seven later lived with a parent or with other relatives for short periods, but fifteen failed to find support from relatives. It was characteristic of the group as a whole that the subjects had experienced numerous changes of foster homes or institutions during their childhood.

Only one of the ten illegitimate subjects was born into a family classed as functioning and the remaining nine were born into families classed as dysmorphic.

Desertion by one or both parents accounted for the disruption of eight families and early death of a mother for two. In three other cases the children were removed from their homes after the parents had been prosecuted for neglect. Early death of a father had occurred in two families which nevertheless continued to function.

Agency Contacts (Table III, opposite).—Three of the 74 functioning families were visited by the School Attendance Officer, in each case for truancy, which required only one visit and no prosecution.

Two functioning families appeared in the records of the N.S.P.C.C., each with single contacts to press for attendance at school medical clinics. In accord with our definition, five of six deviant families on the list of the School Attendance Officers had been prosecuted and five deviant families had been cautioned or prosecuted by the N.S.P.C.C. The Children's Department had records of five deviant

families, and in four of these the subject had been taken into temporary care.

TABLE III
AGENCY CONTACTS OF 84 DEVIANT AND FUNCTIONING FAMILIES

Agency	Type of Family		
	Deviant	Functioning	Total
School Welfare	6	3	9
N.S.P.C.C.	5	2	7
Children's Department	5	0	5
Known to None of These Agencies	0	69	69
Total Number of Contacts	16	5	21
Total Number of Families	10	74	84

For the functioning families, the average number of contacts with a wide range of social agencies was one; for deviant families it was three.

II. AT THE TIME OF FOLLOW-UP

Domestic Unit.—At the time of follow-up, twelve of the young women from functioning and two from dysmorphic families were married; eight of the young men from functioning, two from dysmorphic, and one from deviant families were also married. 81 (96 per cent.) of the subjects from functioning and deviant families were living either with parents or spouses at the time of follow-up. Against this, only ten (45 per cent.) of the subjects from dysmorphic families were living with kin. By this time, seven cases, one from a functioning family and six from dysmorphic families, were in mental deficiency hospitals. All had been admitted on emergency applications soon after leaving school, following misdemeanours which were sometimes multiple but always minor (petty theft, two cases; "found wandering" and the suspicion of immorality, two cases; impudence to an employer, one case; "out of control" at home or school, two cases). No child was in a mental deficiency institution at 10 years of age and Table IV shows that, for E.S.N. groups, admission is a specific hazard of adolescents who have no support from kin.

Employment Records.—There was little unemployment in the area during the relevant period and only those subjects who were later admitted to institutions had had difficulty in finding jobs. There was, however, a high proportion of unstable job histories in the dysmorphic group. Thus, the average duration of each job in the dysmorphic group was less than 20 months compared with more than 30 months in the other two groups. Similar differences were

TABLE IV
PRESENT HOME OF 106 SUBJECTS, BY FAMILY TYPE AND SEX

Home		Type of Family			
		Functioning	Deviant	Dysmorphic	Total
With Kindred	With family of origin	52	8	3	63
	With spouse alone	13	1	3	17
	With spouse and parents	5	0	0	5
	With spouse and spouse's parents	2	0	1	3
	With other relatives	0	0	3	3
With Strangers	In Lodgings	0	1	3	4
	No fixed abode	0	0	1	1
Institution	Mental deficiency colony	1	0	6	7
	Other medical institution	0	0	1	1
	Private or church institution	1	0	1	2
Total		74	10	22	106

detected when aspects of work were considered: *e.g.* longest period in any one job, total number of jobs, number of short term jobs, and number of persons with stable jobs within a year of leaving school. Calculations taking into account the duration of the period of possible employment and thus adjusted for age at leaving school, for time spent in the forces or in institutions, and for marriage in women yielded differences that are unlikely to be due to chance ($P = 0{\cdot}01$ for the men, $P = 0{\cdot}03$ for the women). As the distributions were not normal, probabilities were calculated by a distribution-free test (Mood, 1950).

Legal Offences.—The 68 male subjects included eleven who had had one legal charge preferred against them and eighteen who had been charged more than once. The family group distribution of these offenders was as follows:

Legal Charges (males only)	Family Group			
	Functioning	Deviant	Dysmorphic	Total
None	33	3	3	39
One	6	1	4	11
More than One	11	4	3	18
Total at risk	50	8	10	68

It is clear from these figures that relative to the numbers "at risk", single and multiple offences featured most often in the dysmorphic group.

Only three females, two from dysmorphic and one from a functioning family, had had legal charges proferred against them.

Illegitimate Births.—Two women, one from a functioning and one from a dysmorphic family, had had babies out of wedlock.

Discussion

Objective Classification of Family Function.—Important functions of a family are to provide a home with a set of enduring human relationships, and basic standards of care for its dependent members.

Satisfactory function depends largely on the intact structure of the family. Structure is based on kinship and marriage and in our society the typical unit is the elementary family, composed of father, mother, and children, who share a common home until the children are old enough to marry or earn their own living. In the present study relationships were regarded as enduring if at least one parent or parent-substitute had lived with the child until he reached the age of 10. In some cases, family function was maintained in spite of departures from the typical structure of the elementary family, as Table II shows. As the results for subjects from these families were similar to those from typical functioning families, it was thought unnecessary to categorize them separately. Thus the following variations in structure satisfied the criterion of enduring relationships:

(1) Substitution of other kin for parents, *e.g.* grandmother (2 cases).

(2) One parent fulfilling the functions of both mother and father, *e.g.* widowed mother able to rear her children without breaking up the family (2 cases).

(3) Temporarily incomplete families, *e.g.* a father on war service (17 cases), away on distant work (1 case), or a parent in hospital (2 cases).

(4) Families with a child temporarily removed but persisting as a unit and maintaining contact with the child, *e.g.* 3 cases evacuated and 7 cases admitted to hospital for more than 3 months.

Other variants, such as adoption, might have been allowed in the category of functioning families but did not in fact occur.

In dysmorphic families, structure was so damaged that they were unable to provide the child with enduring relationships. This arose usually in situations which were already precarious because of poverty, irregular employment, isolation from kin, or physical and mental handicaps, and the immediate factors were usually parental death or desertion, separation or divorce, or an illegitimate birth following a casual union. As a result, all 22 cases in this group had been in supportive institutions at some time before the age of 10. This is a high proportion of the total as compared with a national sample of children born in 1946 (Douglas and Blomfield, 1958). At 5 years of age, only 0·07 per cent. in the national sample had been separated from their parents; taking the same age and the same criteria for separation, 13·5 per cent. of our sample would have suffered separation.

Basic standards of care were regarded as maintained if the child had been given economic and social support at a level not in conflict either with norms accepted at all levels of society or with local social norms. Social norms may be taken as "people's ideas about what behaviour is customary and what behaviour is right and proper in their social class" (Bott, 1956).

The chosen criterion of deviation from these norms was prosecution or cautioning by three social agencies concerned with child care which have the power to invoke legal sanctions. We chose this criterion because contacts with these agencies arose from conflicts with general and local norms. Child care that was considered inadequate by neighbourhood standards had sometimes provoked reports to the agencies. In other cases failure to attend school, a general obligation enforced by law, had initiated action by education authorities. In addition, social workers in these and other agencies, influenced in turn by their own notions and standards, ultimately determined whether the agencies acted and how they acted. The families in this group had usually failed to provide adequate shelter, food, clothing, or schooling, and they belonged to the category of so-called "problem families".

Intervention by an agency which could invoke legal sanctions had usually meant that a host of other agencies, voluntary and statutory, had also intervened at some stage. The nature as well as the number of contacts which functioning families had with social agencies differed from those of the deviant families. Deviant families tended to attract disciplinary action, as opposed to functioning families for whom the contact was more often voluntary, as with child guidance clinics.

The parents of most of the deviant families were native to the districts in which they now lived and had numerous social contacts with their relatives. Although these connexions might have helped to maintain the cohesion of the family, they did not screen its members from contact with the social agencies. Support from relatives, however, might have prevented admissions to supportive institutions.

FAMILY CLASSIFICATION AND CAREER.—E.S.N. subjects, grouped by objective criteria according to the function of their family of origin, have careers with distinctive patterns.

The great majority of subjects from functioning families were holding steady jobs, living with their parents or spouses, and leading stable social lives. The social adjustment of subjects from deviant families, as judged by dwelling place, admissions to institutions, employment, and contact with the law, was similar to those from functioning families. At the time of follow-up most of the subjects had yet to experience child-bearing and child-rearing, the phase of the family cycle during which agency attention is most often attracted to the deviant family.

For those from dysmorphic families, the follow-up situation was markedly different. More than half of the cases from these families were living either alone in lodgings or in institutions, their work records were poor, and their police records tarnished.

SELECTION FOR ASCERTAINMENT.—As in previous surveys of ascertained E.S.N. youths, a disproportionate number of subjects from "broken homes" was found (Ramer, 1946; Reeves-Kennedy, 1948; Graham, 1958; Ferguson and Kerr, 1958). This excess might arise because more subjects of a given intelligence are ascertained from broken families than from intact families, or because in some way broken families produce more backward children than intact families. According to a study in Derby, boys with intelligence quotients below 80 came from broken homes no more often than matched controls with intelligence quotients in the range 94 to 106 (O'Connor and Loos, 1951). This suggests that, given the same intelligence, children from dysmorphic families are more liable to be ascertained as educationally subnormal than are those from functioning families. This may also apply to deviant families, whose members tend to fail in school and to attract the attention of teachers and of the school health service. Other evidence from this investigation suggests that selection by social factors occurs to a marked degree in ascertainment and probably accounts for the I.Q. difference between the two sexes.

The higher average test score for boys (P 0·001–0·002) is consistent with the larger proportion of boys ascertained in our sample and also throughout the country (Ministry of Education, 1956). As the distribution of intelligence between the sexes is similar, it follows that the threshold of intelligence for ascertainment is higher for boys than for girls. Thus factors beyond intelligence, such as social and classroom behaviour, must influence the selection of boys rather than of girls for ascertainment.

This sex difference occurred only in functioning and deviant families, from which boys came more than twice as often as girls, and not in dysmorphic families, from which they came in approximately equal numbers. Evidently the disturbances arising from dysmorphic situations were so severe that they overrode the usual sex bias, or else girls were considered to be more in need of special education in these situations.

ADMISSIONS TO MENTAL DEFICIENCY HOSPITALS.—The present survey has shown that, on leaving school, ascertained children from dysmorphic families are more liable to be admitted to mental deficiency institutions, than are those from intact families. Admissions tend to follow a typical pattern. At 18 years of age these children are discharged from the care and the institutions of the Children's Departments to fend for themselves. During adolescence, behaviour difficulties, frequent job changing and homelessness, or the prospect of such problems, exert a cumulative effect on those concerned with the care of these dull children, until finally admission is precipitated by some trivial offence.

Subjects from functioning families make social adjustments which are probably normal in their social groups and they are rarely admitted to mental deficiency hospitals. It follows that, just as the children who are officially recognized as educationally subnormal are not a true cross-section of mentally-retarded children, neither are the inmates of mental deficiency institutions a true cross-section of mentally-retarded adults. These institutions include an unduly high proportion of individuals from dysmorphic families, with the result that assessments of their social competence, intelligence, or personality cannot be relied upon to indicate the social consequences of mental retardation as such. Thus the present investigation suggests that the high

delinquency rates and poor employment records of the subnormal in the community and especially in hospital may be largely a consequence of family disruption and homelessness. Several previous studies may need re-evaluation in the light of these findings.

Family analysis has identified a group of dysmorphic families among the educationally subnormal, which is vulnerable irrespective of intelligence quotient. In most cases they need homes, counselling, and therapy continuously from the onset of disaster until they become settled in the community.

Summary

(1) A classification of families, based on their provision of a set of enduring human relationships and basic social needs, is described. These groups are: functioning, deviant, and dysmorphic.

(2) The relationship between type of family and the eventual adjustment of 106 subjects, ascertained subnormal at school, has been studied at a follow-up made when they were between 20 and 24 years of age.

(3) In terms of domestic stability, employment records, and contacts with the law, subjects from dysmorphic families are shown to be at a disadvantage compared with those from functioning and even from deviant families. In their early 20s, subjects from deviant families resemble those from functioning families in social performance.

(4) Ascertained young people from dysmorphic families are shown to be a vulnerable group; more than a quarter of them had been admitted to mental deficiency institutions after leaving school, although they were no less intelligent than the ascertained children from intact families, who were very rarely admitted.

(5) Intelligence did not account for the observed differences in social performance in the three family types.

(6) Boys are more likely to be ascertained than girls of the same intelligence, although this does not hold for subjects from dysmorphic families.

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References

Bott, E. (1956). *Hum. Relat.*, **9**, 325.
Burt, C. L. (1950). "The Backward Child", 3rd ed. Univ. London Press, London.
Douglas, J. W. B., and Blomfield, J. M. (1958). "Children Under Five". Allen and Unwin, London.
Ferguson, T., and Kerr, A. W. (1958). *Scot. med. J.*, **3**, 31.
Graham, J. A. G. (1958). *Med. Offr.*, **99**, 191.
Ministry of Education (1956). "The Health of the School Child: Report of the Chief Medical Officer of the Ministry of Education for 1954 and 1955". H.M.S.O., London.
Mood, A. M. (1950). "Introduction to the Theory of Statistics". McGraw-Hill, New York.
O'Connor, N., and Loos, F. M. (1951). "Occupational Record of Backward Boys: the Relation between Intelligence, Family Size, and Job History". Report for the Medical Research Council (Unpublished).
Ramer, T. (1946). "The Prognosis of Mentally-Retarded Children". *Acta psychiat. (Stockh.)*, Suppl. 41.
Reeves-Kennedy, R. J. (1948). "The Social Adjustment of Morons in a Connecticut City". Mansfield-Southbury Training Schools (Social Service Department, State Office Building), Hartford.
Registrar-General (1958). "Statistical Review of England and Wales for the Two Years, 1952–1953. Supplement on Mental Health". H.M.S.O., London.

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SICKNESS ABSENCE AMONG HOSPITAL NURSES

BY

A. BARR

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During the year ended March 31, 1957, all absences from duty, whether for sickness or non-sickness reasons, were recorded systematically for student, trained, and other nursing staff employed in the hospitals of the United Oxford Hospitals and the Oxford Regional Hospital Board. Altogether 6,232 persons (732 males and 5,500 females) were observed in 103 hospitals having almost 15,000 beds. The detailed analysis of the results is available elsewhere*; the purpose of the present paper is to give a brief summary of the more important and interesting findings relating to sickness.

METHOD

Each absence was recorded on a proforma showing reference number, age, sex, marital status, employment, residence, grade of staff, duration of absence, and medical diagnosis or cause of absence. In order to estimate the population at risk, a census of the nursing staff was taken on a day half way through the survey period and similar information to that required for absences was recorded for all staff employed on that day.

The forms were completed mainly by matrons, checked by the hospital administrative staff where practical, and forwarded to the Regional Board's headquarters for analysis. The survey, which was carried out at no additional cost to the Board, ended on March 31, 1957.

A pilot investigation (Davies and Barr, 1956), covering the 6 months ending June 30, 1955, gave an opportunity to test the efficiency of the scheme and enabled those taking part to become familiar with the procedure. It is believed that a high standard of accuracy was achieved.

* "The Health of the Hospital Nurse" (1959). Oxford Regional Hospital Board.

DEFINITIONS

It was convenient to group the nurses into four grades:

Trained. — Trained nurses, practising certified midwives, and pupil midwives undergoing Part I and II training.

Students. — Student nurses and pupil assistant nurses.

Others. — Enrolled assistant nurses, nursing auxiliaries, and other nursing staff engaged mainly on nursing duties.

Nursing Assistants. — Nursing Assistants in Mental and Mental Deficiency Hospitals. (The small number of nursing assistants employed results in only limited comparisons being made for this group.)

In analysis the indices of sickness recommended by the Registrar General's Advisory Committee on Medical Nomenclature and Statistics Sub-Committee (General Register Office, 1954) have been used. In this paper reference is made to two indices:

(1) *Inception Rate* (*Spells*).—The number of spells of sickness which start during a defined period divided by the average number of persons exposed to risk during that period.

(2) *Average Duration per Spell.*—The total of the entire durations of all spells of sickness ending during a defined period divided by the number of spells ending during that period.

These rates may be used in relation to all diseases (including accident or other violence) and total population at risk or in relation to individual diseases and to different sections of the population.

A "spell of sickness" is taken as "a period during which a person is sick on one day (or shift) or on each of a consecutive series of days (or shifts)". The duration of a spell of sickness "normally includes

each of the consecutive series of days for which sickness is recorded". All spells reported were coded according to the Classification of Diseases of the World Health Organization (1948) and summarized in the 29 diagnostic groups set out in Table IV (below).

Results of Inquiry

Total Sickness Absence

Sickness absences for all staff during the 12 months numbered 5,309, which was 85·2 per cent. of the total absences from all causes. The total number of days lost through sickness was 68,536, which, in terms of working capacity, is equivalent to some 190 full-time staff or an annual outlay of between £60,000 and £70,000.

Of the total spells of sickness, 4,803 related to female and 506 to male staff. Since the number of male staff is comparatively small, most of what follows relates to female nursing staff. When male and female absences are considered this will be made clear in the text and tables.

Absences by Age Group

Apart from age, sex, and grade, it is of interest to consider nursing staff according to their residence, employment status, and marital status. However, most of the resident staff are single and full-time employees, while most of the non-resident staff are married and part-time. These three factors cannot be conveniently separated and here only residence is considered so that differences between residents and non-residents may in fact reflect differences between single and married or between full-time and part-time.

In Table I, the inception rate (spells) is given for resident and non-resident female staff according to grade and age. The overall rate was highest among nursing assistants and lowest among trained nurses, though there was little difference between nursing assistants, other nursing staff and students. In each grade, the rate was higher for non-residents than residents and this held good at practically every age level. The difference between residents and non-residents was particularly noticeable among the young student nurses (roughly from 18 to 21 years of age), and it was also fairly well evident in trained staff aged 30–34 years and other staff up to the age of about 30 years. Apart from student nurses, who were mostly under 25 years of age, the rate in age specific groups tended to be lowest for trained staff and highest for nursing assistants, with other nursing staff occupying an intermediate position.

Frequency of Spells

Slightly more than a third of the female student nurses and other nursing staff had no spells of sickness absence during the survey year compared with over a half of the female trained staff. Just over 3 per cent. of the students had four absences or more against nearly 1 per cent. for trained staff and 4 per cent. for other nursing staff. The distribution of absences according to the grade of staff is given in Table II (opposite).

TABLE I

INCEPTION RATE (SPELLS) IN FEMALE NURSING STAFF, BY GRADE, RESIDENCE, AND AGE GROUP
(Note: To avoid decimal point inception rates are multiplied by 100)

Grade of Nurse	Residence	Inception Rate (spells) by Age Group (yrs)															Number of Staff at Risk*
		18	19	20	21	22	23	24	25–	30–	35–	40–	45–	50–	55–	60+	All Ages	
Student	Resident ..	66	88	96	87	103	94	63	88	117	**64**	**100**	**200**	—	—	—	89	1,342
	Non-Resident	104	210	174	169	93	191	**156**	121	**106**	**167**	**75**	**50**	—	—	—	114	246
	Both ..	68	98	107	126	104	111	79	96	113	**95**	**42**	**100**	—	—	—	97	1,588
Trained	Resident ..	—	—			76			54	45	39	37	31	29	**42**	**29**	48	998
	Non-Resident	—	—			107			94	103	67	62	60	70	**85**	**45**	80	1,012
	Both	—	—			90			73	74	53	52	47	50	62	**36**	64	2,010
Other ..	Resident ..	—	—			71			**57**	**60**	**118**	**81**	**100**	**170**	**25**	**20**	73	255
	Non-Resident	—	—			146			124	116	118	121	102	103	88	89	112	1,270
	Both ..	—	—			109			107	107	118	118	102	107	81	83	105	1,525
Nursing Assistants	Resident ..	TOO FEW OBSERVATIONS															54	50
	Non-Resident	—	—			142			122	113	137	134	115	113	96	**94**	119	319
	Both	—	—			109			103	109	126	124	117	111	93	**60**	110	369

Bold figures indicate rates calculated on less than twenty absences.
* Excludes one student and seven trained staff with incomplete information on residence

TABLE II

FREQUENCY DISTRIBUTION OF SPELLS OF ABSENCE IN FEMALE NURSING STAFF, BY GRADE AND AGE GROUP

Spells of Absence	Total Staff	Grade of Staff			Age Group (yrs)							
		Students	Trained	*Other	<20	20–	25–	30–	35–	40–	45+	Not Stated
0	2,486	613	1,150	723	313	476	274	232	222	252	624	93
1	1,874	590	610	674	278	526	221	163	162	132	392	—
2	728	246	182	300	116	203	75	63	61	58	152	—
3	264	89	57	118	45	71	24	27	26	27	44	—
4	90	32	9	49	11	23	9	9	9	10	19	—
5	39	14	6	19	2	12	6	5	2	6	6	—
6+	19	5	3	11	4	4	2	4	2	1	2	—
Total	5,500	1,589	2,017	1,894	769	1,315	611	503	484	486	1,239	93
Per cent. Nil Absences . .	45·2	38·6	57·0	38·2	40·7	36·2	44·8	46·1	45·9	51·5	50·4	—
Standard Error of per cent.	0·67	1·22	1·10	1·12	1·77	1·32	2·01	2·22	2·27	2·27	1·42	—
Mean	0·87	0·99	0·61	1·05	0·94	1·01	0·85	0·91	0·87	0·84	0·76	—

* Other includes nursing assistants.

A convenient method of summarizing the distribution in Table II is to consider the percentage having no sickness absence during the survey period. Among trained staff the percentage with nil absences was significantly greater than for either the students or the other nursing staff, the difference between the percentages in both instances exceeding ten times the standard error of the difference. On the other hand, there was practically no difference between the students and other nursing staff.

An analysis of the frequency of absence by age indicated that the percentage of nil absences was significantly lower ($P = 0{\cdot}05$) for ages 20 to 24 than for any other age group. After 30 years, as age increased, the mean number of absences tended to fall slightly.

DURATION OF ABSENCE

Almost a third of all absences for male and female nurses consisted of 1 or 2-day spells, while over a half lasted for periods under a week (Table III). Short-term absences (*i.e.* 1 or 2 days) were slightly commoner among female nurses in the younger age groups, but this did not appear to be so for men. Remarkably little variation occurred between the sexes in the duration of absence. There was a slight, though insignificant, tendency for men under 25 and over 40 years of age to return to work earlier than the corresponding groups of women, but in the intermediate ages the trend was reversed.

An analysis of the absence by the day of the week on which the absence began (Fig. 1, overleaf) showed, not unexpectedly, that numerically more absences began on Mondays than on any other day of the week. It seems likely that some sickness spells starting on Sunday were reported as starting on the following day. There was a definite tendency for work to be resumed on Monday irrespective of the day of the week on which the absence started.

TABLE III

PERCENTAGE DISTRIBUTION OF SPELLS OF ABSENCE, BY LENGTH OF SPELL AND AGE GROUP

Sex		Male				Female			
Age Group (yrs) . .		<25	25–	40+	Total	<25	25–	40+	Total
Duration of Sickness Absence (days)	1	23·2	16·7	24·1	20·7	18·5	20·7	15·7	18·4
	2	7·2	16·3	11·3	12·9	14·8	11·5	11·4	12·9
	3	15·9	5·6	7·7	7·9	10·3	8·2	5·8	8·4
	4	5·8	3·3	1·5	2·9	7·1	4·1	3·3	5·2
	5	7·2	5·1	2·1	4·2	4·6	3·4	2·1	3·6
	6	4·3	5·6	3·1	4·4	5·0	3·5	2·7	3·9
	7	4·3	4·7	3·6	4·2	5·2	5·0	4·1	4·9
	8	4·3	5·1	0·5	3·1	3·7	3·5	4·7	3·9
	9	—	1·9	1·5	1·5	2·9	2·1	2·2	2·5
	10–	14·5	17·7	19·0	17·7	16·2	19·0	21·4	18·5
	20–	5·8	7·4	5·6	6·5	6·2	7·2	9·0	7·3
	30+	7·2	10·7	20·0	14·0	5·3	11·5	17·4	10·5
Total		100	100	100	100	100	100	100	100
*No. of Spells . .		69	215	195	479	2,044	1,398	1,355	4,797

* Excludes 27 males and 6 females for whom information was incomplete.

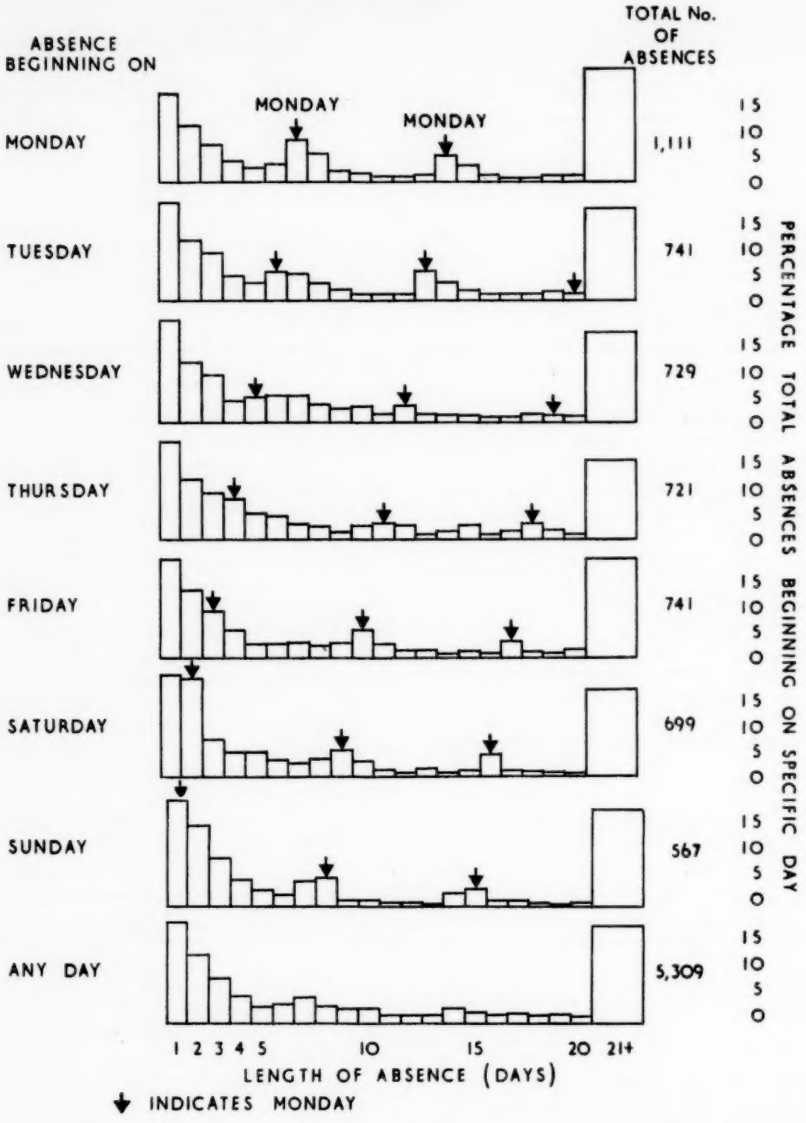

FIG. 1.—Length of absence in relation to day on which absence began, showing percentages which began on a specific day.

Absences also tended to favour 7 or 14 days' duration, but this tendency was not found for spells commencing on Wednesday, Thursday, Friday, or Saturday.

CAUSE OF ILLNESS

By far the most common single cause of absence was the common cold. No less than 17·3 per cent. of the medical absences for female nurses were due

to colds (Table IV). A further 10·2 per cent. were caused by sinusitis, tonsillitis, and other throat complaints, 3·9 per cent. by influenza, 2·4 per cent. by bronchitis, and 2·4 per cent. from tuberculosis, pneumonia, and other respiratory diseases. Thus, just over a third of the medical absences were due to diseases of the respiratory system. Other relatively large groups were diseases of the stomach and duodenum, hernia and other abdominal conditions, and diseases of the skin and cellular tissue. Injuries and accidents numbered 249, to which must be added 92 absences due to sprains. Together all injuries and accidents accounted for 7·1 per cent. of all medical absences and ranked fifth largest (apart from the miscellaneous group) in number of spells.

In terms of incapacity, the most important group was injuries and accidents (including sprains) which accounted for a tenth of the total days lost. Next in order were sinusitis, tonsillitis, and other nose and throat conditions.

An examination of the inception rate (spells) by age showed a decreasing gradient with age in the following diagnostic groups:

1. Infective and Parasitic Diseases.
11. Colds.
12. Sinusitis, tonsillitis, and other nose and throat conditions.
16. Dental conditions.
18. Appendicitis.
19. Hernia and other abdominal conditions.
22. Diseases of the skin and cellular tissue.

The inception rate (spells) tended to rise with age for the following diagnostic groups:

9. Diseases of the circulatory system (excluding varicose veins).
10. Varicose veins.
13. Influenza.
15. Bronchitis.

There was a decided peak in the rate in adult or late adult life in the following diagnostic groups:

5. Psychosis.
28. Sprains.

TABLE IV

PERCENTAGE DISTRIBUTION OF SPELLS OF SICKNESS AND DAYS ABSENT OF FEMALE NURSING STAFF DURING THE SURVEY YEAR, CLASSIFIED ACCORDING TO MAIN DIAGNOSIS

Survey Number	Diagnostic Group: Short Description	International List Number	Percentage of Total Spells	Percentage of total days sickness
1	Infective and Parasitic Diseases	040–138	2·7	4·0
2	Neoplasms	140–239	0·6	1·1
3	Allergy and Diseases of Endocrine System	240–289	1·6	2·4
4	Diseases of the Blood	290–299	0·6	0·9
5	Psychosis	300–326	1·3	3·3
6	Organic Nervous Disorders	330–369, 780–781	2·4	2·5
7	Eye Conditions	370–389	1·0	0·8
8	Ear Conditions	390–398	0·8	0·8
9	Diseases of Circulatory System (excluding Varicose Veins)	400–456, 461–468, 782	1·9	4·7
10	Varicose Veins	460	0·5	1·3
11	Colds	470, 783·3, 788·9	17·3	6·1
12	Sinusitis, Tonsillitis, and other Nose and Throat Conditions	471–475	10·2	7·6
13	Influenza	480–483	3·9	3·3
14	Tuberculosis, Pneumonia, and Other Diseases of the Respiratory System	001–008, 490–494, 510–521, 783·1	2·4	4·7
15	Bronchitis	500–502	2·4	3·6
16	Dental Conditions	530–539	1·9	1·1
17	Diseases of Stomach and Duodenum	540–545, 784	7·4	3·5
18	Appendicitis	550–553	1·1	2·6
19	Other Abdominal Conditions	560–617, 785	7·8	5·9
20	Genito Urinary System (female)	620–637	3·3	4·8
21	Complications of Childbirth, etc.	640–689	0·4	0·9
22	Diseases of Skin and Cellular Tissue (Boils and Abscesses)	690–698	5·3	4·0
23	Dermatitis and Eczema	700–716	1·2	2·2
24	Arthritis and Rheumatism	720–727	2·7	3·7
25	Other Diseases of the Bones	730–749,787	3·0	4·8
26	Debility, Depression, Headache (otherwise unspecified)	790–792	5·2	6·5
27	Injuries and Accidents	N800–N839, N850–N999	1·9	2·5
28	Sprains	N840–N848	1·9	3·2
29	All Other Conditions	—	7·7	7·5
Total	Per cent.		100·0	100·0
	Number		4,828	61,105

Includes 25 instances with multiple diagnoses (i.e., cases where it was not possible to say which was the primary cause of illness).

The age-specific trend is given for the larger groups (*i.e.* those with total absences exceeding 150) in Table V. Colds (Group 11) affected the young more severely than the old, but the difference was not great. The peak incidence occurred at ages 20 to 25 years, though the average length of spell at this age was among the lowest of any age group. The average duration per spell of sickness was greatest between 35 to 54 years.

In the case of sinusitis, tonsillitis, and other nose and throat complaints (Group 12) there was a marked degree of association between age and inception rate (spells), the rate declining rapidly as age increased. The average length of the spell did not vary much between the ages, though there was some suggestion for absences to be slightly longer in the older ages. 65 per cent. of those aged up to 25 years returned to work within 7 days, compared with 53 per cent. for those aged 25 to 39 and 44 per cent. for those aged 40 and upwards.

The incidence of disorders of the stomach and duodenum (Group 17) tended to be slightly higher at the younger ages. The average length of absence was very short (under 4 days) in persons under 25 years of age, whereas it was nearly a fortnight for persons over 45 years.

The inception rate (spells) from skin diseases was particularly high among students, and fell rapidly with increasing age. Whereas, in skin conditions like boils and carbuncles, the inception rate on the whole diminished with age, the rate remained much the same at all ages in dermatitis and eczema, with peaks at 25–29 and over 55.

Injuries and accidents (excluding sprains) occurred most frequently at the youngest and the oldest age groups. Sprains, on the other hand, increased sharply after 30 years of age, and declined again about 50 years.

The epidemiological pattern is summarized in Fig. 2 (opposite), which shows, for each age group, the seven diagnostic groups with the highest and the seven diagnostic groups with the lowest inception rate (spells) and average duration per spell. It will be seen that the inception rate (spells) was comparatively high throughout all or most ages for colds (Group 11), sinusitis, tonsillitis, and other nose and throat conditions (Group 12), diseases of stomach and duodenum (Group 17), other abdominal conditions (Group 19) and injuries and accidents (Group 27).

In contrast, the inception rate (spells) was comparatively low at practically all ages for neoplasms (Group 2), diseases of the blood (Group 4), ear conditions (Group 8), varicose veins (Group 10), and appendicitis (Group 18). The average length of the spell was generally high at all ages for psychosis

TABLE V

INCEPTION RATE (SPELLS), AND AVERAGE DURATION PER SPELL (DAYS) BY AGE GROUP, FOR SELECTED DIAGNOSTIC GROUPS IN TABLE IV

*Diagnostic Group Number	Index	Age Group (yrs)										
		<20	20–	25–	30–	35–	40–	45–	50–	55–	60+	All Ages
11	(*a*)	152	193	139	165	176	148	91	148	105	**88**	152
	(*b*)	4·2	3·9	4·7	4·5	5·6	4·9	5·4	5·0	2·9	5·0	4·5
12	(*a*)	134	125	93	80	72	60	53	60	35	**40**	90
	(*b*)	6·9	8·8	8·9	10·8	9·9	10·2	14·7	11·6	6·3	36·8	9·5
13	(*a*)	**18**	26	41	**38**	37	49	31	36	65	**80**	34
	(*b*)	11·0	8·1	8·4	16·4	11·7	11·4	9·4	9·7	15·6	10·0	10·8
17	(*a*)	59	87	95	56	48	64	31	62	70	24	65
	(*b*)	2·6	3·9	7·0	3·8	12·6	4·4	11·3	11·3	10·7	15·7	6·0
19	(*a*)	81	85	75	54	81	74	60	36	35	24	69
	(*b*)	4·2	7·2	10·0	10·1	14·4	11·8	13·2	18·1	13·6	11·3	9·5
20	(*a*)	**16**	38	25	50	25	35	31	23	5	**8**	29
	(*b*)	4·8	9·7	7·4	10·2	35·0	37·1	35·1	34·1	50·0		18·5
22 and 23	(*a*)	83	75	60	48	29	27	41	42	50	32	57
	(*b*)	7·2	8·9	15·2	14·2	10·9	14·2	19·0	24·2	20·9	13·0	12·0
27 and 28	(*a*)	74	73	57	57	71	73	80	59	73	12	62
	(*b*)	10·8	14·1	14·5	15·3	25·9	22·5	26·6	14·5	20·3	31·8	17·3
All Groups	(*a*)	905	1,025	858	911	870	848	780	831	755	616	878
	(*b*)	8·5	9·3	11·1	13·7	15·5	14·5	19·4	17·1	18·5	22·8	12·7

(*a*) Inception Rate (Spells) (×100). (*b*) Average Duration per Spell (days). * For key to Diagnostic Groups, see Table IV.
Bold figures indicate rates based on less than twenty absences.

(Group 5), tuberculosis, pneumonia, and other diseases of the respiratory system (Group 14), and appendicitis (Group 18), whereas, in colds (Group 11), dental conditions (Group 16), and diseases of stomach and duodenum (Group 17), it was comparatively low.

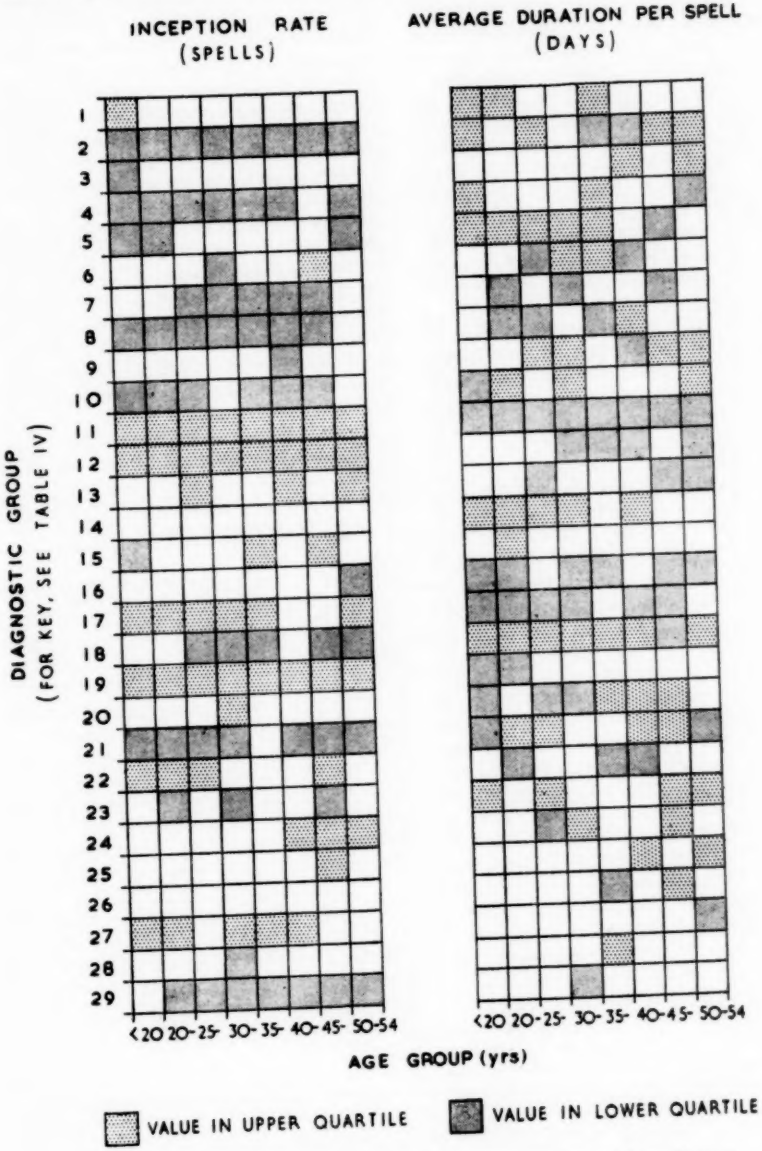

FIG. 2.—Inception rates and average duration per spell, by age group and diagnostic group.

COMPARISON WITH OTHER POPULATION GROUPS

An assessment of the incidence of sickness among nurses was limited by the fact that very little comparable data were available. The two main sources of comparison used in this survey were the London Transport Executive (1956) and the Ministry of Pensions and National Insurance (1958).

The London Transport Executive provides a comprehensive analysis of sickness absence for various groups of their employees covering the years 1949 to 1952. For present purposes the comparison was based on Central Bus Male Conductors for the years 1949–1952 and Unmarried Female Clerical Staff for the years 1950–1952.

The information from other main source of comparison — the Ministry of Pensions and National Insurance — relates to the certificates of incapacity of insured persons in England and Wales for the year 1955/1956. These statistics are compiled in the course of administering the two main insurance benefits (sickness and injury) and together provide a fairly complete picture of incapacity exceeding 3 days' duration. Insured persons consist mainly of employed and self-employed men and single women and about a third of the married women similarly employed; the main classes excluded are non-industrial civil servants, housewives, retired pensioners, most students, and all children.

The method adopted was to calculate the number of spells expected for each sex and age-specific group of nurses from the inception rate (spells) given in the two sources of comparison. The ratio of the observed number of spells to the expected number of spells provides a measure of comparison.

This analysis (Table VI) suggests that nurses were absent more frequently than would be expected on the basis of the experience of the staff of the London Transport Executive or the national insured population for infectious diseases, ear conditions, circulatory diseases (including varicose veins) and skin diseases (including dermatitis and eczema). On the other hand, there were fewer absences among nurses

TABLE VI

NUMBER OF SPELLS OF SICKNESS OBSERVED AMONG NURSES AND NUMBER EXPECTED ON THE NULL HYPOTHESIS FROM STAFF OF THE LONDON TRANSPORT EXECUTIVE AND FROM SICKNESS AND INJURY CLAIMS MADE ON THE MINISTRY OF PENSIONS AND NATIONAL INSURANCE

*Diagnostic Group Number	Number of Spells of Absence among Nurses (Male and Female)			Ratio of Observed to Expected (per cent.)	
	Observed	Expected			
		London Transport Executive (1)	Ministry of Pensions (2)	London Transport Executive	Ministry of Pensions
1	131	84·7	46·0	155	285
2	26	—	7·6	—	342
3	62	—	35·1	—	177
5	62	133·2	102·8	65	83
6	63	59·1	48·7		
	125	192·3	151·5		
7	28	52·8	20·2	53	139
8	29	25·0	19·9	116	146
9 and 10	106	63·0	57·8	168	183
13 and 15	294	753·1	470·3	39	63
16	41	—	27·4	—	150
18	55	—	29·7	—	185
22	195	126·6	86·8	154	225
23	56	37·0	32·5	151	172
24	115	140·6	135·9	82	85
27	195	—	105·4	—	185
28	83	—	30·5	—	272

(1) *London Transport Executive:* The expected sickness absence is based upon the sickness experience of Male Bus Conductors between 1949 and 1952 and on Female Clerical Officers (unmarried women) between 1950 and 1952.
(2) *Ministry of Pensions and National Insurance:* The expected sickness Absence is based upon the claims for sickness and injury benefit for the year 1955/1956.
* For key to Diagnostic Groups, see Table IV.

than expected for psychosis and nervous disorders, influenza and bronchitis, and arthritis and rheumatism. It was possible to compute the ratio for a few additional diagnostic groups based on the insured population and this, taken alone, suggested that spells of sickness were also higher among nurses for neoplasms, allergy and diseases of the endocrine system, dental conditions, appendicitis, and injuries and accidents.

As far as the comparison goes, and bearing in mind the relative size of the diagnostic groups, it would seem that nurses were particularly susceptible to infectious, circulatory, and skin diseases. For infective and parasitic diseases the number of spells of absence among nurses was over 56 per cent. higher than among staff of the London Transport Executive and nearly three times as high as among the general insured population. Diseases of the circulatory system and varicose veins were two-thirds higher in nurses than in the London Transport Executive employees and four-fifths higher than in the insured persons. Spells of sickness from diseases of the skin and cellular tissue were respectively 54 per cent. and 125 per cent. greater in nurses than in the staff of the London Transport Executive or the insured persons, while the corresponding figures for dermatitis and eczema were 43 per cent. and 63 per cent.

Hospital Differences

To examine how far sickness absence varied between hospitals a special analysis was made of nineteen hospitals employing 100 or more nursing staff. For technical reasons, the incidence of illness was based on non-infectious diseases and restricted to the first absence only. In analysing the duration of absence, attention was limited to one disease—the common cold—the only condition for which sufficient data was available. Colds which lasted more than 14 days were excluded, as they were most probably illnesses which had begun as colds and had been protracted for some reason not specifically reported.

No differences in the frequency of absence were found between hospitals beyond what would be expected to arise from differences between the categories of staff and the varying proportion of these categories in hospital. On the other hand, the length of absence varied significantly ($P<0{\cdot}01$) between hospitals.

Discussion and Conclusions

The analysis of the sickness absence among 6,232 nurses over a period of one year suggests that nurses are not subject to any excessive health hazard. This conclusion, however, must be tempered by the reservation that the survey related to a comparatively short period of time (12 months), so that all adverse effects may not have had adequate time to make themselves felt. In the present instance, the survey period was free from epidemic outbreaks and, for this reason, the results are probably fairly typical.

The considerably higher inception rate (spells) found among non-resident students cannot be overlooked. Among the trained and other nursing staff the rate was also higher for non-residents than residents, but the differences were not nearly so marked. On the existing evidence it would seem that absences might be reduced appreciably by extending residential facilities for students especially those under 20 years of age. If additional accommodation is not available, then it would seem desirable, from the viewpoint of health, that students in their first 2 years of training should be given priority over trained staff for hospital living accommodation.

Nurses appear to be more prone to infectious, circulatory, and skin diseases than might be expected. The largest group numerically is that relating to diseases of the skin and cellular tissue including dermatitis and eczema, which accounted for approximately 6 per cent. of the spells of absence and the same percentage of working days lost. There would seem to be an urgent need for further detailed studies of these diseases among nurses with a view to formulating preventive measures.

Some importance is attached to the finding that, taking the composition of staff into account, the incidence of sickness absence did not vary between hospitals by more than could be expected to be due to chance fluctuations, whereas the average length of absence differed substantially between hospitals. The analysis does not encourage the hope of reducing the loss of labour through sickness by trying to reduce the frequency of illness (this does *not* take into account multiple absences), but it does suggest that the length of absence is susceptible to inter-hospital variations. This might prove a fruitful line for administrative action though there may be difficulty in bringing about any spectacular improvement.

That there is no common objective criteria for determining the duration of absence is well known and has been commented on by the *Lancet* (1957) in connexion with convalescence after hospital treatment. Some suggestion that this occurs among nurses is provided by the finding of an excess of absentees returning to duty on Mondays. Part of the differences between hospitals may, therefore, be due to differences between Medical Officers or General Practitioners in their approach to sick leave. On the other hand, it may be that the differences in the

average length of absence are related to the inherent structure of the hospital. The differences are sufficiently interesting to warrant further consideration.

Statistics of sickness absence, when collected over some time, are of considerable importance both medically and administratively. Medically, they give an epidemiological picture of disease which is essential for the formation of sound preventive programmes. Administratively, they provide an informative index to staff welfare and labour wastage. The anomalies and limitations of absence statistics generally have been considered by Buzzard (1954), and it is clear that further research has to be made into the best method of using such data. With the improvement of definitions and the development of statistical techniques, sickness statistics should form a useful source of information. To quote only two possible instances; on the medical side research could be made into the occurrence and spread of epidemics among hospital staff, while on the administrative side it should be feasible in time to set confidence limits to the inception rates at each hospital against which changes in policy could be measured objectively. Thus, in order to facilitate research into morbidity and the uses to which statistics can be put, it would seem worthwhile to record sickness absences for hospital staffs at periodic intervals.

Summary

(1) Sickness absence occurring during the 12 months ending March 31, 1957, among 6,232 nurses employed in the hospitals of the United Oxford hospitals and the Oxford Regional Hospital Board have been analysed.

(2) The total number of sickness absences was 5,309, which is 85·2 per cent. of the total absences from all causes. The total number of days lost through sickness was 68,536.

(3) 38 per cent. of the female students and other nursing staff had no spells of sickness during the year compared with 57 per cent. for trained staff. 3·2 per cent. of the students, 0·9 per cent. of the trained staff, and 4·2 per cent. of other staff had four absences or more during the year.

(4) Sickness absence was greater among non-resident than resident staff. The differences were particularly marked for student nurses roughly under 20 years of age.

(5) The most frequent cause of absence was the common cold. A third of the total absences was due to respiratory complaints.

(6) The inception rate (spells) for female nurses for all illnesses combined tended to fall with age after 20 years. In contrast the average duration of absence tended to increase with age.

(7) Infectious, circulatory, and skin diseases appeared to be commoner among nurses than expected.

(8) Allowing for the composition of staff, the inception rate (spells) did not vary between hospitals by more than would be expected. In contrast, the average duration of absence varied significantly between hospitals.

(9) It is concluded that:

(*a*) Residential accommodation for the young student nurse should be reviewed.

(*b*) While nurses generally do not appear to be any less healthy than other groups of the population, the excess sickness absences from infectious, circulatory, and skin diseases deserves attention.

(*c*) That causes of the variation between hospitals in the duration of sickness absence should be investigated.

(*d*) In order to facilitate further research into the medical and administrative uses of sickness absence statistics in hospitals, all sickness absences for hospital staff should be recorded on a standardized form at periodic intervals.

Thanks are due to the matrons and administrative staff at the hospitals for providing the material on which this paper is based and to the staff of the Regional Records and Statistical Unit for painstaking analysis. I am also grateful to Dr. E. A. Cheeseman, Department of Social and Preventive Medicine, the Queen's University, Belfast, for helpful comments on the original draft of the paper, and to Dr. J. H. Edwards of the Population Genetics Unit of the Medical Research Council for advice. The survey was carried out under the aegis of the Oxford Regional Hospital Board.

REFERENCES

Buzzard, R. B. (1954). *Brit. J. Sociol.*, **5**, 238.

Davies, J. O. F., and Barr, A. (1956). *Monthly Bull. Min. Hlth.* **15**, 158.

General Register Office (1954). "Measurement of Morbidity". A Report of the Statistics Sub-Committee on Medical Nomenclature and Statistics. Studies on Medical and Population Subjects, No. 8. H.M.S.O., London.

Lancet (1957), **2**, 1269.

London Transport Executive (1956). "Health in Industry". Butterworth, London.

Ministry of Pensions and National Insurance (1958). "Digest of Statistics analysing Certificates of Incapacity, 1955/56".

Oxford Regional Hospital Board (1959). "The Health of the Hospital Nurse".